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Survey of Breast Implant Patients: Characteristics, Depression Rate, and Quality of Life

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Abstract

Background: Quality of life (QOL) among breast augmentation patients is a growing research area, with newly worrisome data on psychological health in this group.

Objectives: The authors investigate characteristics of breast implant patients, including motivations for surgery, depression rate, effect of surgery on daily activity and work activity, and overall psychosocial and cosmetic changes through a self-reported survey.

Methods: Of 121 consecutive breast augmentation patients treated by the senior author (AK) between 2005 and 2008, a total of 93 patients were reachable via e-mail and were sent a 47-question survey, which they could return anonymously. Answers were processed by QuestBack mail system (QuestBack AS, Oslo, Norway) and sent to the authors as diagrams and figures, rather than as raw data.

Results: The response rate for this survey was 67%. Average follow-up was 2.8 years. For 65%, the motivation for surgery was cosmetic; 48% replied it was for emotional reasons (reduced self-esteem), 22% for intimate reasons, and 10% for physical reasons. Before the operation, 6% of respondents reported diagnosed depression. The postoperative changes were equal between improved and worsened depression. In 27%, the operation increased motivation for daily activities; 73% felt like a "whole" person, and 26% experienced improvement in social skills. In terms of the cosmetic result, 93% were satisfied or very satisfied. However, 27% indicated they were unsatisfied or very unsatisfied with skin sensation.

Conclusions: Although in some cases depression increased postoperatively, the depression rate in our study was still lower than the published range in the general population in Norway. Breast enlargement increased motivation to perform daily activities in our patients. The procedure improved QOL in both psychosocial and cosmetic aspects. However, the relatively high percentage of patients who experienced reduced breast skin sensitivity postoperatively can represent a challenge for the surgeon. Multicenter/clinic studies are necessary to form a better idea about the implications of the depression rate postoperatively.

Keywords

patient satisfaction, quality of life, breast augmentation, survey

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An increasing number of Norwegian women undergo breast enlargement surgery for cosmetic and reconstructive reasons.[1,2] Approximately 70 000 women in Norway have breast implants. (The total population in Norway is about 5 million.) Despite the high incidence of breast augmentation in Norway and the Western world, relatively few studies have been published concerning postoperative quality of life (QOL).[3-13] It seems to be a common view that women with breast implants have certain stereotypical traits: single, young, wants that are considered glamorous, and seeking very big breasts. This stereotypical patient comes from a specific social level and is not well educated. She is epitomized on the front pages of tabloid and popular style magazines, possibly a reflection of a society that focuses on physical appearance and voluptuous women. However, aesthetic surgeons subjectively know that this stereotype does not accurately represent the majority of our patients.

Therefore, we designed a study to investigate and describe via a written survey the type of women who choose to undergo breast enlargement, including their

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motivation(s). Questions concerning age, relationship status, children, education, and others were included on the survey; we anticipated that the results would help us provide information about whether a stereotypical patient truly exists in our population. Because recently published (and somewhat worrisome) data about this patient group have documented a high incidence of psychiatric diseases such as depression and a higher suicide rate,[14-16] we also included questions about depression. The survey also included queries about specific aspects of QOL in this group of patients. The effects of breast augmentation procedures on daily activities and participation in work activities have not been addressed in the literature to our knowledge, so these were included, together with an analysis of overall cosmetic and psychosocial changes.

METHODS

This study was conducted using the QuestBack mail system (QuestBack AS, Oslo, Norway), which guarantees anonymity for the participants. By registering e-mail addresses from our patients, we could send them the questionnaire by e-mail. Patients received a phone call from us some weeks in advance, giving them information about the study and informing them that an anonymous questionnaire about the results would be e-mailed to them and confirming the correct e-mail address. There were no discussions about the contents of the study during the phone conversations. However, if they requested the information, patients were informed of the aim of the study, which was to improve quality of our clinical work. Our aim in including phone calls as part of the survey protocol was to increase the response rate by encouraging the patients to check their e-mail and answer the questionnaire. Patient identity was blinded to the authors because the incoming answers were processed by the QuestBack system and sent as diagrams and figures. The authors had no influence on forming the results. We believe that this system ensured that the patients answered freely.

Of 121 potential candidates from a consecutive series of patients who underwent cosmetic breast implant augmentation at the senior author's (AK) clinic between 2005 and 2008, 93 were reachable via e-mail. The survey (Appendix, available online at www.aestheticsurgeryjournal.com/supplemental) consisted of 47 questions that were specifically grouped with the intent of seeking information about the following aspects: the breast implant patient herself, the postoperative depression incidence/change, changes in daily motivation and work activities, psychosocial changes, and cosmetic changes. (In our study, depression was self-reported but was defined as a diagnosis of depression from health personnel.) In addition, some general questions were included about motivations for the procedure, patient willingness to recommend similar surgery to a friend, and information related to the surgery itself. Answer options were divided into 3 options on a scale: grade 1, *very disappointed or disappointed;* grade 2, *no opinion/no change;* and grade 3, *satisfied or very satisfied.*

Table 1. Type of Work in Breast Augmentation Patient Population

	No. (%)
Physical work	17 (28)
Office work	13 (22)
Physical and office work	13 (22)
Work at home	5 (8)
Other	12 (20)

RESULTS

The response rate was 67%. Mean postoperative follow-up time for the respondents was 2.8 years. Respondents were distributed as follows in terms of age: 8 (13%) patients were 21 years or younger, 20 (33%) patients were between 22 and 29 years, 15 (25%) patients were between 30 and 37 years, and 18 (29%) patients were 38 or older. At the time of operation, 48 (79%) patients were in a romantic relationship and 13 (21%) patients had no relationship. Only 19 (31%) patients had no children at the time of operation, whereas 32 (53%) patients had 1 or 2 children and 10 (16%) had 3 children or more. Concerning education level, 38 (62%) patients had finished elementary or high school, whereas 23 (38%) studied at university or college. Patient income per year was $40 000 to $80 000 USD for 30 patients (49%), $81 000 to $120 000 USD for 9 patients (15%), and more than $120 000 USD for only 2 (3%). The job types of patients are shown in Table 1.

Motivation for surgery was as follows: 40 (65%) patients sought breast augmentation for cosmetic reasons, 29 (48%) indicated emotional reasons (reduced self-esteem), 13 (22%) indicated intimate reasons, and 6 (10%) specified physical reasons. Cosmetic motivation was mostly related to the appearance of the breasts themselves and the body image of patients stemming from their form and size. Motivation for intimate reasons was mostly related to the feeling patients had with their partner, their willingness to show their naked breasts, and the improvement surgery would (or did) have in their sexual life. Some patients gave more than 1 reason for undergoing surgery, which explains why respondent numbers exceed the total number of patients (Table 2). Only 3 (5%) patients gave an unspecific response ("other") as their reason for undergoing the operation. Preoperatively, 4 patients (6%) had been diagnosed with depression. The changes after the operation were equal between improved and worsened depression—1 patient each, with "no difference/not specified" as a response from the remaining 2 patients.

In 27% of patients, their motivation for daily activity had increased to better or much better postoperatively, and the actual daily activity increased to better or much better among 25%. However, improvements in motivation for work activity were reported by only 13% (Table 3). Sixty-nine percent felt that they had a better or much better life postoperatively.

Table 2. Patients' Motivation for Seeking Surgery[a]

	No. (%)
Cosmetic reasons	40 (65)
Emotional reasons	29 (48)
Intimate reasons	13 (22)
Physical reasons	6 (10)
Other	2 (3)

[a]Some patients gave more than 1 reason for having surgery.

Table 3. Changes Daily Activity, Work Activity, and Motivation

To What Degree Do You Feel That Operation Has Changed:	Lesser Degree, No. (%)	No Change, No. (%)	Greater Degree, No. (%)
Motivation for daily activity	1 (1.6)	44 (72.1)	16 (26.3)
Daily activity	1 (1.6)	45 (73.8)	15 (24.6)
Motivation in work activity	1 (1.6)	52 (85.2)	8 (13.2)
Effectiveness in work	1 (1.6)	54 (85.5)	6 (9.9)

Table 4. Psychosocial Changes After Breast Augmentation

To What Degree Do You Feel:	Lesser Degree, No. (%)	No Change, No. (%)	Greater Degree, No. (%)
That life has changed after breast enlargement	1 (1.6)	18 (29.5)	42 (68.9)
Like a "whole" person	1 (1.6)	15 (24.6)	45 (73.8)
Feminine	1 (1.6)	3 (5.0)	8 (93.4)
The operation affected your social skills	1 (1.6)	45 (73.8)	15 (24.6)

Table 5. Cosmetic Changes After Breast Augmentation

To What Degree Are You Satisfied With:	Unsatisfied, No. (%)	No Opinion, No. (%)	Satisfied, No. (%)
Breast volume after operation	10 (16.4)	2 (3.3)	49 (80.3)
Breast shape after operation	4 (6.6)	2 (3.3)	55 (90.1)
Sensation of the skin on the breasts after operation	16 (26.7)	9 (15.0)	35 (58.3)
Scars on the breasts after operation	9 (14.7)	9 (14.7)	43 (70.6)
Symmetry between the breasts after operation	8 (13.1)	2 (3.3)	51 (83.6)
Softness of the breasts after operation	2 (3.3)	5 (8.2)	54 (88.5)
The nipple and the area around it after operation	5 (8.4)	8 (13.6)	46 (78.0)
The cosmetic result as a whole	2 (3.3)	2 (3.3)	57 (93.4)
The breast enlargement as a whole	3 (4.9)	3 (4.9)	55 (90.2)

As many as 93% of patients felt more feminine after breast enlargement. Social skills were unchanged in most patients (74%), whereas shyness in intimate situations improved in 66%. Other aspects of psychosocial character are described in Table 4.

Considering the cosmetic result, 93% were satisfied or very satisfied. Ninety percent responded that they were satisfied with the shape of the breasts, and 71% were satisfied with the scars after surgery. Eighty-four percent found their breasts symmetric and 89% were pleased with the softness (Table 5). Even though many women were satisfied with the cosmetic result and the result as a whole, 27% indicated that they were unsatisfied or very unsatisfied with skin sensation. A large majority (90%) of patients reported that the postoperative results were as expected, better, or much better, and 80% would recommend the operation to a friend. With the enlargement as a whole, 91% were satisfied or very satisfied (Figure 1).

DISCUSSION

Outcome reports from surgical interventions are traditionally based on morbidity and mortality. However, other aspects are important to investigate.[17] Unfortunately, today, evaluations and reports based on surgeons' evaluation of the procedure dominate clinical research. Few studies have addressed patient perspective in this matter.[18-20] Rohrich et al[19] found that it was difficult to correlate subjective patient symptoms with postoperative improvement in QOL after explantation. Others[18,20] have suggested a model called the BREAST-Q that can be used to study the effects and effectiveness of breast surgery from a patient perspective. In this study, we focused on the patient's perspective and her subjective evaluation of the result more than on the surgeon's opinion/perspective. After all, the patient is the one who lives with the surgical result. The study was designed to eliminate bias through guaranteed anonymity for patients, absence of industry sponsorship for the study, and use of a balanced scale for answer alternatives (such as "dissatisfaction," "no effect/no judgment," and "satisfaction"), rather than offering leading questions or answer options.

Tabloid and popular style magazines often depict breast augmentation patients as stereotypically single, young, and glamorous (or seeking glamour). They portray them as desiring very big breasts and having little education. This idea is strengthened by television shows and video programming, including some plastic surgery channels. However, we believe this stereotypical view is changing and becoming closer to the picture of a "normal," average woman. This could be explained by greater acceptance of

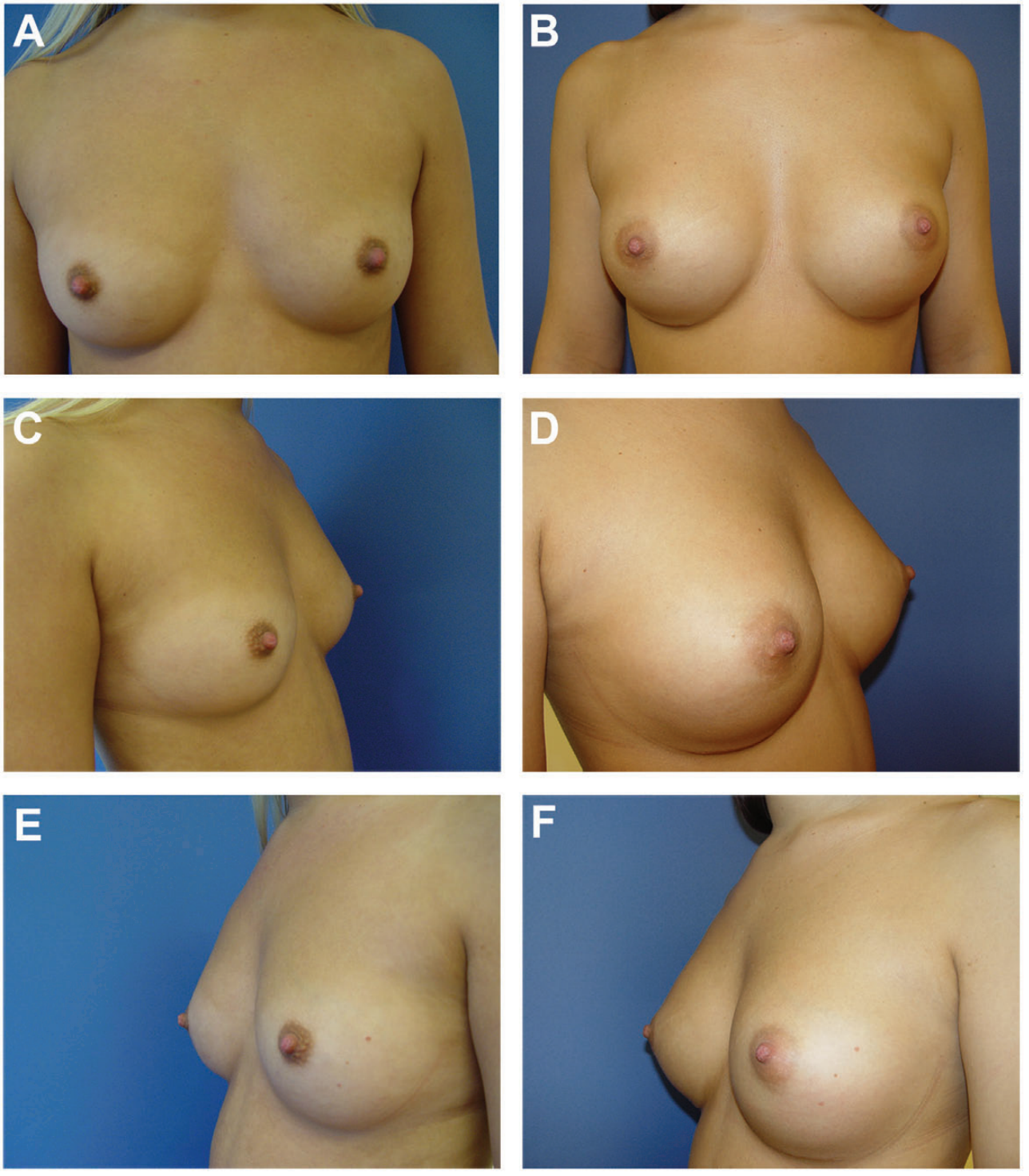

Figure 1. (A, C, E) This 22-year-old woman presented with mammary hypoplasia. (B, D, F) Three years after subglandular placement of 240-gram silicone gel round implants.

aesthetic procedures in general, and breast augmentation specifically, among all sorts of women in various countries and cultures. Technical improvements and continual evolution from cosmetic surgeons have also likely contributed to this, along with increasing savviness and competence among patients considering cosmetic surgery procedures. However, our study did show that only a small percentage of women had finished a higher level of education. This

could partly be explained by the high number of patients who were in their early 20s at the time of surgery. Several may have been studying at university or college but had not finished at the time they completed their questionnaire.

Although some patients reported an increase in postoperative depression, the depression rate in our study was lower than the given range in a general population in Norway, which ranges from 7% to 17%.[21-25] Our statistics are in contrast to recent alarming data about the rate of psychological disorders in this group of patients.[14,16,26-29] Our respondents were equally distributed among rural and urban areas, so our lower rate could be explained by a balanced set of social, educational, and health backgrounds, but we cannot conclude with certainty that our sample represents a whole population or explains the difference in depression rates from our study versus others.

In our study, breast enlargement increased motivation to perform daily activities and, to lesser a degree, work activity. We think that the general improvement in QOL contributes to this, as physical and psychological limitations were improved. Although some studies have not shown improvement in health-related QOL,[30] we found that 69% of women believed their life was better after surgery, in both cosmetic and social aspects.[31] The procedure provided amelioration of feelings of wholeness and self-esteem, as well as being comfortable in intimate situations. According to Didie and Sarwer,[32] breast augmentation patients seem to undergo the surgery for their well-being and are focused on becoming more feminine. In this way, with regard to surgical motivation, our results were in line with the reports of other investigators.[33-35] However, some of our patients had more than 1 motivation for the procedure.

The question of reduced breast skin sensitivity was approached on a general level in the survey; the questions were not specific for an area or duration because we did not expect a large percentage of patients to be affected. However, we think the loss of sensibility is related to the submammary scar area, in the lower pole of the breast. A similar study is planned for patients who have undergone augmentation-mastopexy, and questions about the characteristics of the area of reduced sensibility will be expanded upon. The study will also include a larger sample in the cosmetic breast augmentation group, with longer follow-up.

The patient group in this study was taken from 1 clinic, which therefore includes a select group of women who were considered acceptable candidates for surgery and agreed to the clinic policy of not placing extremely large implants. Patients with certain psychological characteristics that could have affected the outcome of the study were therefore naturally excluded. Furthermore, the study included only those patients who had e-mail and could answer a questionnaire sent through that method, thereby excluding a small group of patients, which could have also affected the final picture.

The data on patients' psychological health were obviously gleaned solely from postoperative patient reports; no psychometric measures were included, which was a shortcoming of the study. Furthermore, the use of a nonvalidated survey, rather than valid and reliable psychometric measures previously documented in the literature, was a shortcoming in our research. Ideally, there should have been a standardized evaluation of patients' pre- and postoperative mental health, to help us gain a better understanding of the relationship between breast augmentation and depression. Additional studies, preferably multiclinic/center studies, are also needed to increase patient population to form a better picture of the QOL outcomes.

CONCLUSIONS

In our study—which included patients from a variety of ages, backgrounds, socioeconomic status categories, and education levels—breast augmentation was associated with an increased quality of life, including motivation to perform daily activities and overall satisfaction/self-perception. However, an important challenge for the surgeon is the relatively high percentage of patients who were dissatisfied with postoperative skin sensitivity on the breasts. Multicenter studies with standardized questions concerning mental health are needed to better specify the depression rate and its postoperative implications on a larger scale.

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Disclosures

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REFERENCES

1. Helsetilsynet- tilsyn med sosial og helse. Kosmetisk kirurgiske inngrep i Norge. *Rapport fra Helsetilsynet*. 2004;8:44-47.
2. Tindholdt T, Mesic H, Tønseth KA, Harbo SO. Silikonbrystimplantater gjennom 40 år. *Tidsskrift Norske Lægeforening*. 2005;125:739-741.
3. Bruck JC, Kleinschmidt A, Ottomann C. Increased self-confidence and decreased sexual discomfort after subpectoral mammoplasty. *Handchir Mikrochir Plast Chir*. 2011;43(2):112-118.
4. Chahraoui K, Danino A, Frachebois C, Clerc AS, Malka G. Aesthetic surgery and quality of life before and four months postoperatively. *Ann Chir Plast Esthet*. 2006;51(3):207-210.
5. Crerand CE, Infield AL, Sarwer DB. Psychological considerations in cosmetic breast augmentation. *Plast Surg Nurs*. 2007;27(3):146-154.

6. Fruhstorfer BH, Hodgson EL, Malata CM. Early experience with an anatomical soft cohesive silicone gel prosthesis in cosmetic and reconstructive breast implant surgery. *Ann Plast Surg*. 2004;53(6):536-542.
7. Hedén P, Boné B, Murphy DK, Slicton A, Walker PS. Style 410 cohesive silicone breast implants: safety and effectiveness at 5 to 9 years after implantation. *Plast Reconstr Surg*. 2006;118(6):1281-1287.
8. Klassen AF, Pusic AL, Scott A, Klok J, Cano SJ. Satisfaction and quality of life in women who undergo breast surgery: a qualitative study. *BMC Womens Health*. 2009;9:11.
9. Lamberg S, Manninen M, Kulmala I, et al. Health-related quality of life issues after cosmetic breast implant surgery in Finland. *Ann Plast Surg*. 2008;61:485-488.
10. Sarwer DB, Bartlett SP, Bucky LP, et al. Bigger is not always better: body image dissatisfaction in breast reduction and breast augmentation patients. *Plast Reconstr Surg*. 1998;101(7):1956-1961, discussion 1962-1963.
11. Spear SL, Pelletiere CV, Menon N. One-stage augmentation combined with mastopexy: aesthetic results and patient satisfaction. *Aesthetic Plast Surg*. 2004;28(5):259-267.
12. Solvi AS, Foss K, von Soest T, Roald HE, Skolleborg KC, Holte A. Motivational factors and psychological processes in cosmetic breast augmentation surgery. *J Plast Reconstr Aesthetic Surg*. 2010;63(4):673-680.
13. von Soest T, Kvalem IL, Roald HE, Skolleborg KC. The effects of cosmetic surgery on body image, self-esteem, and psychological problems. *J Plast Reconstr Aesthetic Surg*. 2009;62(10):1238-1244.
14. Jacobsen PH, Hölmich LR, McLaughlin JK, et al. Mortality and suicide among Danish women with cosmetic breast implants. *Arch Intern Med*. 2004;164(22):2450-2455.
15. Sarwer DB, LaRossa D, Bartlett SP, Low DW, Bucky LP, Whitaker LA. Body image concerns of breast augmentation patients. *Plast Reconstr Surg*. 2003;112(1):83-90.
16. Sarwer DB, Brown GK, Evans DL. Cosmetic breast augmentation and suicide. *Am J Psychiatry*. 2007;164(7):1006-1013.
17. Pusic AL, Chen CM, Cano S, et al. Measuring quality of life in cosmetic and reconstructive breast surgery: a systematic review of patient-reported outcomes instruments. *Plast Reconstr Surg*. 2007;120(4):823-837, discussion 838-839.
18. Pusic AL, Reavey PL, Klassen AF, Scott A, McCarthy C, Cano SJ. Measuring patient outcomes in breast augmentation: introducing the BREAST-Q Augmentation module. *Clin Plast Surg*. 2009;36(1):23-32, v.
19. Rohrich RJ, Rathakrishnan R, Robinson JB Jr, Griffin JR. Factors predictive of quality of life after silicone-implant explanation. *Plast Reconstr Surg*. 1999;104(5):1334-1337.
20. Pusic AL, Klassen AF, Scott AM, Klok JA, Cordeiro PG, Cano SJ. Development of a new patient-reported outcome measure for breast surgery: the BREAST-Q. *Plast Reconstr Surg*. 2009;124(2):345-353.
21. Kringlen E, Torgersen S, Cramer V. Mental illness in a rural area: a Norwegian psychiatric epidemiological study. *Soc Psychiatr Epidemiol*. 2006;41:713-719.
22. Baumeister H, Härter M. Prevalence of mental disorders based on general population surveys. *Soc Psychiatr Epidemiol*. 2007;42:537-546.
23. Sandanger I, Nygaard JF, Ingebrigtsen G, Soerensen T, Dalgard OS. Prevalence, incidence and age at onset of psychiatric disorders in Norway. *Soc Psychiatr Epidemiol*. 1999;34:570-579.
24. Lehtinen V, Sohlman B, Nummelin T, Salomaa M, Ayuso-Mateos JL, Dowrick C. The estimated incidence of depressive disorder and its determinants in the Finnish ODIN sample. *Soc Psychiatr Epidemiol*. 2005;40:778-784.
25. Leiknes KA, Finset A, Moum T, Sandanger I. Current somatoform disorders in Norway: prevalence, risk factors and comorbidity with anxiety, depression and musculoskeletal disorders. *Soc Psychiatry Psychiatr Epidemiol*. 2007;42:698-710.
26. Cole RP, Shakespeare V, Shakespeare P, Hobby JA. Measuring outcome in low-priority plastic surgery patients using quality of life indices. *Br J Plast Surg*. 1994;47(2):117-121.
27. Figueroa-Haas C. Psychological issues associated with breast augmentation. *Issues Ment Health Nurs*. 2009;30:377-382.
28. Lipworth L, Kjøller K, Hölmich LR, Friis S, Olsen JH, McLaughlin JK. Psychological characteristics of Danish women with cosmetic breast implants. *Ann Plast Surg*. 2009;63(1):11-14.
29. Ambro BT, Wright RJ. Depression in the cosmetic surgery patient. *Facial Plast Surg*. 2010;26(4):333-338.
30. Murphy DK, Beckstrand M, Sarwer DB. A prospective, multi-center study of psychosocial outcomes after augmentation with Natrelle silicone-filled breast implants. *Ann Plast Surg*. 2009;62(2):118-121.
31. Antoniuk PM. Breast augmentation and breast reduction. *Obstet Gynecol Clin North Am*. 2002;29(1):103-115.
32. Didie ER, Sarwer DB. Factors that influence the dicision to undergo cosmetic breast augmentation surgery. *J Womens Health (Larchmt)*. 2003;12(3):241-253.
33. Gladfelter J, Murphy D. Breast augmentation motivations and satisfaction: a prospective study of more than 3,000 silicone implantations. *Plast Surg Nurs*. 2008;28(4):170-174.
34. Rubin LR, Klassen A, Cano SJ, Hurley K, Pusic AL. Motivations for breast surgery: a qualitative comparison study of breast reconstruction, augmentation, and reduction patients. *Breast J*. 2009;15(6):666-667.
35. Walden JL, Panagopoulous G, Shrader SW. Contemporary decision making and perception in patients undergoing cosmetic breast augmentation. *Aesthetic Surg J*. 2010;30(3):395-403.

Livskvalitet etter brystforstørring med implantat

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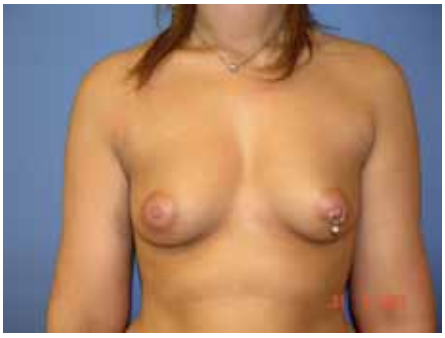
Sammendrag

Mål/Hensikt: Livskvalitet blant kvinner etter gjennomført operasjon med brystimplantat er et voksende forskningsfelt med nylig alarmerende data i forhold til psykisk helse blant denne gruppen pasienter. Derfor er relasjon til depresjon, effekten av behandlingen vedrørende daglig aktivitet, deltagelse i arbeidslivet og det totale resultatet vurdert anonymt av kvinnene selv, av stor interesse.

Materiale og Metode: Totalt kunne 93 pasienter nås via e-mail. Alle ble operert med brystimplantat ved Oslo Plastikkirurgi. Questback spørreskjemaet bestod av 47 spørsmål basert på pasientenes daglige aktivitet, jobb, preoperative og postoperative depresjonsforekomst, og kosmetiske og sosiale endringer. I tillegg ble det spurt om hvilke grunner pasienten hadde for å velge operasjonen. Alle svarene ble bearbeidet automatisk av Questback system.

Resultat: Svarprosenten var 67 %. Før operasjonen hadde 4 pasienter (6 %) en diagnostisert depresjon. Ved operasjonstidspunktet hadde 79 % en partner og 71 % hadde ett eller flere barn. 69 % føler de har fått et vesentlig bedre liv etter operasjonen. Når det gjelder det kosmetiske resultatet og forstørringen i sin helhet, rapporterte pasientene å være fornøyd med henholdsvis 93 % og 91 %. Derimot oppga 27 % at de var misfornøyde eller svært misfornøyde med følelsen i huden på brystene. Blant 27 % har operasjonen økt motivasjonen for daglig aktivitet og 13 % har rapportert forbedring av arbeidssituasjonen. Så mange som 90 % rapporterte at resultatet var som forventet eller bedre.

Konklusjon: Den stereotypiske pasienten som får utført brystforstørring ble ikke bevist. Depresjonsraten i vår studie var lavere enn sammenlignbar normalpopulasjon i Norge. Brystforstørring øker motivasjon til daglig aktivitet, og i noe lavere grad til daglig arbeid. Videre økte prosedyren livskvalitet ved både kosmetiske og psykososiale aspekter. En betydelig utfordring for kirurgen ved brystforstørring er den store andelen som får nedsatt følelse i huden på brystet etter operasjonen. Multi-senter studier er nødvendig for å avklare dette.



Bilde 1a. Kvinne 23 år, før operasjon.

Bilde 1b. Kvinne 23 år, etter op (4 mnd) med 320g anatomisk protese.

Merknad: Dette arbeidet har blitt presentert på Kirugisk Høstmøte oktober 2009, Oslo, Nordisk plastikkirurgisk forenings møte i Island juni 2010 og ved ASAPS (The American Society for Aesthetic Plastic Surgery), The Aesthetic Meeting i Boston mai 2011.

Introduksjon

Stadig flere kvinner i Norge får utført brystforstørrelse, både av kosmetiske årsaker og etter brystkreftoperasjon (1, 2). Anslagsvis har 70 000 kvinner i Norge operert inn brystimplantat. Til tross for den høye forekomsten her til lands og i den vestlige verden er det publisert få studier som belyser ulike aspekter av livskvalitet (3,4,5,6,7,8,9). Tradisjonelt har resultater av kirurgiske inngrep basert seg på morbiditet og mortalitet. Vi ønsket derfor i vår studie av kvinner med brystimplantat å undersøke livskvalitets-

Tabell 1. Alder: Hva er din nåværende alder?

	Antall	Prosent
Under 21 år	8	13,11
22-29	20	32,79
30-37	15	24,59
Over 38 år	18	29,51

Tabell 2. Har du barn, eventuelt hvor mange?

	Antall	Prosent
Har ikke barn	19	31,15
1-2 barn	32	52,46
3 eller flere	10	16,39

aspekter som kosmetiske og psykososiale endringer, effekt på daglig aktivitet, arbeid og en helhetlig vurdering av resultatet rapportert anonymt av kvinnene selv.
I tillegg er det nylig publisert alarmerende data i forhold til psykiske lidelser blant denne gruppen pasienter, særlig i forhold til depresjonsforekomst og høyere suicidrate (10,11,12). Vi inkluderte derfor spørsmål om depresjon i spørreskjemaet som ble sendt ut til pasientene. Det er en oppfatning blant mange i samfunnet at pasienter med bryst-implantat har en del stereotypiske trekk, muligens skapt i et samfunn med mye fokus på kropp og utseende, og brystfagre kvinner som pryder forsidene av magasiner. Vi var derfor interessert i å få et inntrykk av hva slags kvinner som velger å få utført en brystforstørrings-operasjon, og hvorfor de ønsker dette. Spørsmål om alder ved opera-sjon, sivilstand, antall barn, utdanning og lignende ble undersøkt for å kunne beskrive denne pasientgruppen i vårt materiale.

Materiale

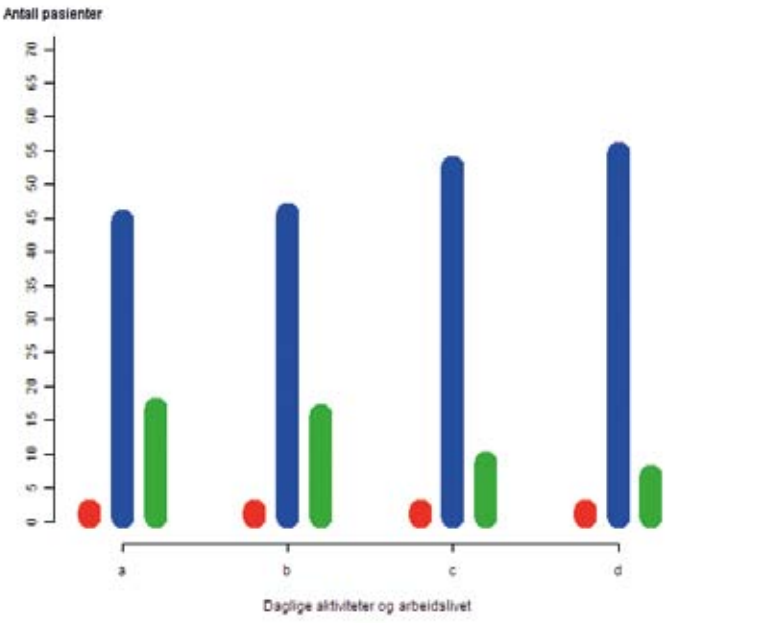
Av totalt 121 potensielle kandidater som har fått utført brystforstørring med implantat ved Oslo Plastikkirurgi fra 2005-2008, kunne 93 nås via e-mail. Spørreskjemaet bestod av 47 spørsmål. I studien fokuserte vi på ulike trekk ved brystimplantat-pasienter, preoperativ depresjonsforekomst og forekomst av depresjon etter operasjonen. Andre aspekter ved livskvalitet inkluderte kosmetiske og psykososiale endringer, pasientenes daglige aktivitet og arbeid.
I tillegg ble det spurt om hvilke grunner pasienten hadde for å velge operasjonen og om de ville anbefalt tilsvarende operasjon til en venn. Svaralternativene var gradert på en 3 trinns skala fra grad 1: svært misfornøyd eller misfornøyd, grad 2: ingen formening, grad 3: fornøyd eller svært fornøyd.

Metode

Undersøkelsen ble gjennomført ved bruk av Questback mailsystem. Studien er designet

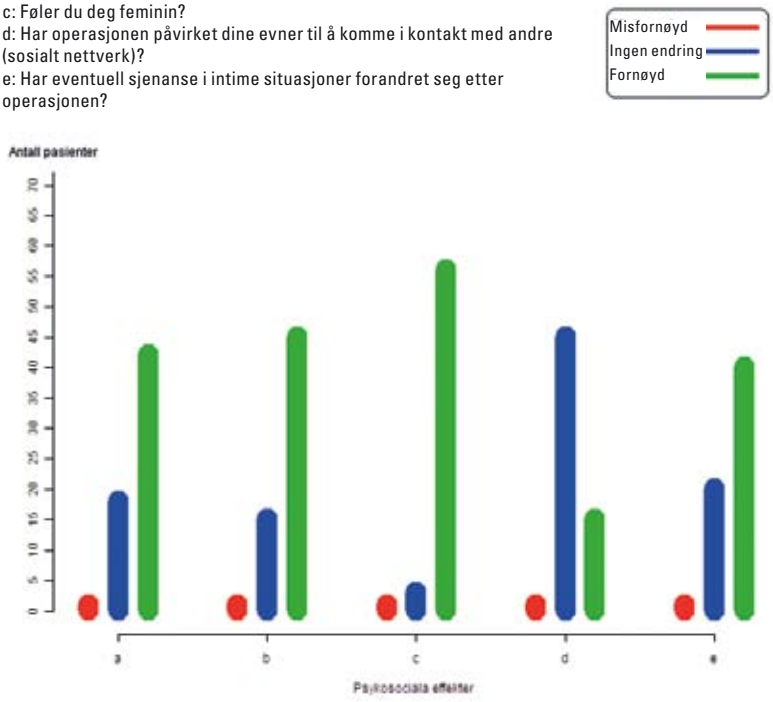
Figur 1. Livskvalitet etter brystforstørring.

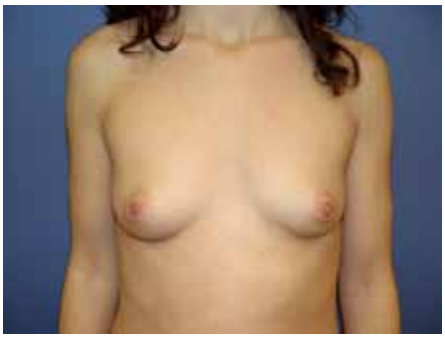
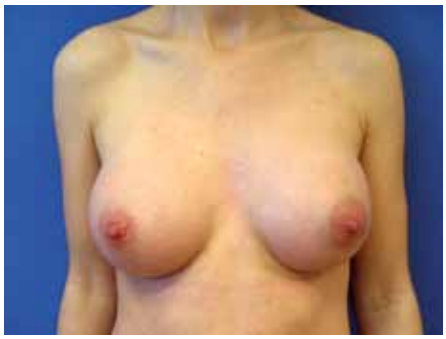
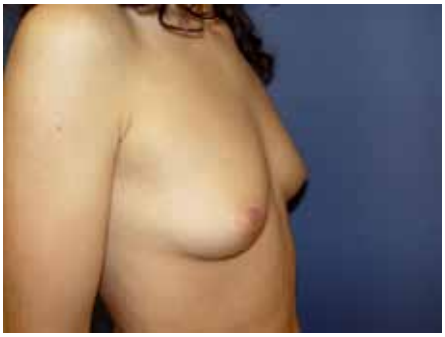
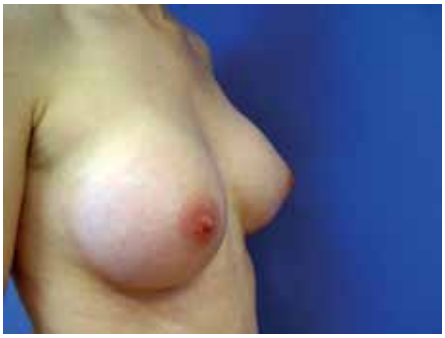
I hvilken grad:
a: Føler du operasjonen har forandret din motivasjon til å utføre dag-lige aktiviteter?
b: Føler du operasjonen har forandret dine daglige aktiviteter?
c: Har operasjonen forandret din motivasjon i arbeidslivet?
d: Har operasjonen forandret produktivitet/effektivitet i ditt arbeid?

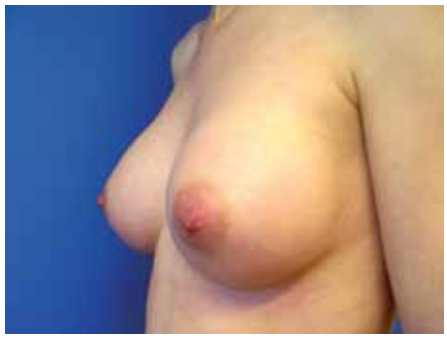


Figur 2. Psykososiale resultater etter brystforstørring.

I hvilken grad:
a: Synes du at livet ditt har forandret seg etter forstørringen?
b: Føler du deg som en "hel" person (feeling of wholeness)?
c: Føler du deg feminin?
d: Har operasjonen påvirket dine evner til å komme i kontakt med andre (sosialt nettverk)?
e: Har eventuell sjenanse i intime situasjoner forandret seg etter operasjonen?





Bilde 2a. Kvinne 26 år, før operasjon.

Bilde 2b. Kvinne 26 år, etter operasjon (5 mnd) med 210g runde.

slik at man unngår bias ved å garantere anonymitet for en serie pasienter, ingen sponsing fra industrien, og bruk av en nøytral svarskala med tre grader fra misfornøyd til fornøyd. Ved å registrere e-mail adressene til våre pasienter kunne vi sende dem spørreskjema via e-mail. Pasientene mottok en telefonsamtale fra oss noen uker i forkant med informasjon om studien. Hensikten var å øke svarresponsen ved å oppfordre pasientene til å sjekke deres e-mail og svare på spørreskjemaet.
Vi kunne ikke identifisere pasientene etter-som all innkommende svar ble prosessert av Questback systemet og sendt til oss som diagrammer og figurer hvor man ikke har mulighet til å påvirke resultatet.
Dette systemet sikrer derfor at pasientene kan svare anonymt.

Resultat

Svarprosenten var 67 % og gjennomsnittlig oppfølgingstid var 2,8 år. Aldersgruppene var jevnt fordelt blant gruppene (Tab. 1). Ved operasjonstidspunktet hadde 79 % en partner og 71 % hadde ett barn eller mer (Tab. 2). Når det kommer til utdanningsnivå har 62 % fullført grunnskole eller videregående skole, mens 38 % har studert ved høyskole eller universitet.

Motivasjon til operasjon: 65 % svarte at årsaken til å gjennomføre operasjonen var kosmetiske grunner, 48 % svarte emosjonelle grunner (redusert selvfølelse), 22 % intime og 10 % fysiske grunner. Kun 5 % har angitt andre grunner til operasjonen enn den virkelige årsaken. Noen pasienter har flere enn en årsak til å gjennomgå operasjon, noe som forklarer at prosenten passerer 100%.

Før operasjonen hadde 4 pasienter (6 %) en diagnostisert depresjon. Endringer etter operasjonen fordelte seg likt mellom bedret og forverret depresjon, en pasient på hver, og to pasienter som rapporterte ingen endring/uspesifisert.

Hos 27 % har operasjonen økt motivasjonen for daglig aktivitet og for økt daglig aktivitet til det bedre for 25 %. 13 % har rapportert forbedring av arbeidssituasjonen. 69 % følte de har fått et vesentlig bedre liv etter operasjonen (Fig. 1).

Hele 93 % av kvinnene følte seg mer feminine etter brystforstørringen. Evnen til å komme i kontakt med andre mennesker holdt seg uendret for de fleste pasientene (74 %), mens eventuell sjenanse i intime situasjoner ble bedret for 66 %. Andre psykososiale resultater er beskrevet i Fig. 2.

Når det gjelder det kosmetiske resultatet var 93 % fornøyde. 90 % oppgir å være fornøyde med fasongen på brystene og 71 % er fornøyde med arrene etter operasjonen. 84 % finner symmetrien mellom brystene tilfredsstillende og 89 % er fornøyd med mykheten av brystene (Fig. 3). Selv om svært mange er fornøyd med det kosmetiske og det helhetlige resultatet, oppga 27 % at de er misfornøyde eller svært misfornøyde med følelsen i huden på brystene. "Rippling" er rapportert hos 15 % og kapsulær kontraktur blant 5 % av pasientene.

Så mange som 90 % rapporterte at resultatet var som forventet eller bedre og 80 % ville anbefalt operasjonen til en venn. Tilfredshet med forstørringen i sin helhet ble rapportert av 91 %, som er svært fornøyde eller fornøyde.

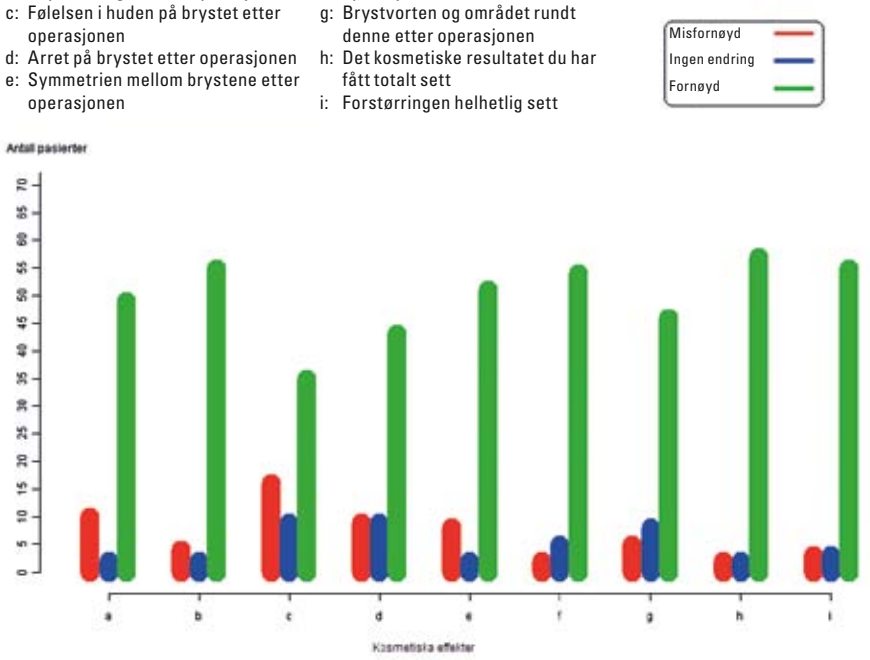
Diskusjon

Resultater av kirurgiske inngrep baseres tradisjonelt på morbiditet og mortalitet. Imidlertid foreligger andre aspekter som er viktige å belyse. Vi ønsket å legge mer vekt på pasientenes perspektiv og opplevelse av resultatet, enn på kirurgens oppfatning. Det

Figur 3. Kosmetiske resultater etter brystforstørring.

Hvor fornøyd er du?

a: Brystvolum etter operasjonen
b: Brystfasongen etter operasjonen
c: Følelsen i huden på brystet etter operasjonen
d: Arret på brystet etter operasjonen
e: Symmetrien mellom brystene etter operasjonen
f: Mykheten i brystene etter operasjonen
g: Brystvorten og området rundt denne etter operasjonen
h: Det kosmetiske resultatet du har fått totalt sett
i: Forstørringen helhetlig sett



er pasientene som til slutt sitter igjen med resultatet. I dag er det dessverre kirurgens egen tilfredshet som dominerer den kliniske forskningen. Studien er designet slik at man unngår bias ved å garantere anonymitet for en serie pasienter og ikke utvalgte pasienter. Det er ikke mottatt sponsing fra industrien og vi har brukt en balansert svarskala uten ledende spørsmål.

Den stereotypiske brystimplantat-pasienten, som ofte pryder ukeblader og magasiner og som er ansett som noe oppmerksomhetssøkende med ønske om større sosial selvtillitt (13,14), har ikke blitt bevist blant våre pasienter. De fleste av kvinnene var i et forhold og hadde barn da de gjennomgikk operasjonen. Allikevel er det en høyere andel som kun har fullført videregående skole enn kvinner som har tatt utdannelse på høyskole eller universitet. I motsetning til den siste tidens studier som viser psykiske lidelser blant disse pasientene (3,10,11,15), var depresjonsraten i vår studie lavere enn en sammenlignbar generell populasjon i Norge, som ligger på 7-17% (16,17,18). Resultatet av operasjonen påvirket ikke utviklingen av depresjonen, men materialet er for lite til å trekke noen sikker konklusjon.

Brystforstørring øker motivasjonen til å utføre daglige aktiviteter og i mindre grad til jobbaktivitet (5). Til tross for at noen studier ikke har funnet økt helserelatert livskvalitet (19), har vi i vår studie funnet at 69 % føler de har fått et vesentlig bedre liv etter operasjonen, både i forhold til kosmetiske og sosiale aspekter. Videre gir prosedyren forbedringer som følelse av "helhet", selvtillit og bedre selvfølelse i intime situasjoner. Det virker som kvinnene velger å gjennomgå operasjonen for sitt eget velbefinnende, og er fokuserte på å bli mer feminine (20). Allikevel er det en betydelig utfordring ved brystforstørring at en andel får nedsatt følelse i huden på brystene etter operasjonen. Pasientgruppen i denne studien er tatt fra én klinikk, hvilket gir en seleksjon av kvinner som er ansett som akseptable kandidater for kirurgi. Derfor er flere studier nødvendig, særlig multi-senter studier, slik at man kan inkludere et stort antall pasienter.

Konklusjon

Det er den gjennomsnittlige kvinne i samfunnet som i dag utfører brystforstørring. Dette gjelder med hensyn til alder, sivil status og utdanning. I tillegg har hun tilsynelatende ikke dårligere psykisk helse hva gjelder depresjon, enn sammenlignbar normalpopulasjon. Brystforstørring øker livskvaliteten, inkludert økt motivasjon til daglig aktivitet, stor tilfredshet med det kosmetiske resultatet og et bedre liv etter operasjonen. Likevel er den høye andelen kvinner som får redusert sensibilitet på brystene etter operasjonen en betydelig utfordring. Multi-senter studier er nødvendig for mer nøyaktig å kunne spesifisere depresjonsraten og utviklingen etter operasjonen.

Interessekonflikt

Ingen oppgitte interessekonflikter.

Referanser

1. Helsetilsynet- tilsyn med sosial og helse. Kosmetisk kirurgiske inngrep i Norge. Rapport fra Helsetilsynet 2004;8:44-47.
2. Tindholdt T, Mesic H, Tønseth KA et al. Silikonbrystimplantater gjennom 40 år. Tidsskr Nor Lægeforen 2005; 125:739-41.
3. Cole RP, Shakespeare V, Shakespeare P et al. Measuring outcome in low-priority plastic surgery patients using Quality of Life indices. Br J Plast Surg 1994;47:117-21.
4. Crerand CE, Infield AL, Sarwer DB. Psychological considerations in cosmetic breast augmentation. Plast Surg Nurs 2007;27:146-54.
5. Gladfelter J, Murphy D. Breast Augmentation Motivations and Satisfaction: A Prospective Study of More Than 3,000 Silicone Implantations. Plast Surg Nurs. 2008;28:170-4.
6. Sarwer DB, Bartlett SP, Bucky LP et al. Bigger is not always better: body image dissatisfaction in breast reduction and breast augmentation patients. Plast Reconstr Surg 1998;101:1956-61;discussion 1962-3.
7. Solvi AS, Foss K, von Soest T, Roald HE, Skolleborg KC, Holte A. Motivational factors and psychological processes in cosmetic breast augmentation surgery. J Plast Reconstr Aesthet Surg 2009 Mar 4.
8. Spear SL, Pelletiere CV, Menon N. One-stage augmentation combined with mastopexy: aesthetic results and patient satisfaction. Aesthetic Plast Surg 2004;28(5):259-67.
9. von Soest T, Kvalem IL, Roald HE, Skolleborg KC. The effects of cosmetic surgery on body image, self-esteem, and psychological problems. J Plast Reconstr Aesthet Surg 2008 doi: 10. 1016/j.bjps.2007.12.093.
10. Jacobsen PH, Hölmich LR, McLaughlin JK et al. Mortality and suicide among Danish women with cosmetic breast implants. Arch Intern Med 2004;164:2450-5.
11. Sarwer DB, LaRossa D, Bartlett SP et al. Body image concerns of breast augmentation patients. Plast Reconstr Surg 2003;112:83-90.
12. Sarwer DB, Brown GK, Evans DL. Cosmetic breast augmentation and suicide. Am J Psychiatry 2007;164:1006-13.
13. Figueroa-Haas C. Psychological Issues Associated with Breast Augmentation. Issues Ment Health Nurs 2009;30:377-382.
14. Lipworth L, Kjøller K, Hölmich LR et al. Psychological Characteristics of Danish Women With Cosmetic Breast Implants. Ann Plast Surg 2009 Jul;63(1):11-4.
15. Ambro BT, Wright RJ. Depression in the Cosmetic Surgery Patient. Facial Plast Surg 2010; 26:333-8.
16. Baumeister H, Härter M. Prevalence of mental disorders based on general population surveys. Soc Psychiatr Epidemiol 2007;42:537-546.
17. Kringlen E, Torgersen S, Cramer V. Mental illness in a rural area. A Norwegian psychiatric epidemiological study. Soc Psychiatr Epidemiol 2006;41:713-719.
18. Sandanger I, Nygaard JF, Ingebrigtsen G et al. Prevalence, incidence and age at onset of psychiatric disorders in Norway. Soc Psychiatr Epidemiol 1999;34:570-579.
19. Murphy DK, Beckstrand M, Sarwer DB. A prospective, multi-center study of psychosocial outcomes after augmentation with natrelle silicone-filled breast implants. Ann Plast Surg 2009;62:118-21.
20. Didie ER, Sarwer DB. Factors that influence the decision to undergo cosmetic breast augmentation surgery. J Womens Health (Larchmt) 2003;12:241-53.

Norwegian Society for AESTHETIC PLASTIC SURGERY

INTERNATIONAL CONTRIBUTION

Breast Surgery

Quality of Life After Breast Enlargement With Implants Versus Augmentation Mastopexy: A Comparative Study

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Abstract

Background: Research regarding quality of life (QoL) among women who have undergone breast aesthetic surgery is expanding. A comparative, anonymous study between the two main breast aesthetic procedures is needed.

Objectives: The authors compared patient characteristics and aspects of QoL among women who underwent breast enlargement with implants (BI group) and those who underwent augmentation mastopexy (AM group).

Methods: Patients at the Oslo Plastic Surgery Clinic were given a 47-question survey to measure QoL. The survey was anonymous; 61 patients who received breast implants and 37 patients who underwent augmentation mastopexy between 2005 and 2009 responded. Answers were processed by a QuestBack return mail system and sent to the authors. Statistical analyses were performed to evaluate significance between the groups.

Results: The response rate was 67% in the BI group and 88% in the AM group. Mean follow-up time was 2.8 years in both groups. Motivation for surgery was primarily cosmetic (65%) and emotional (48%) in the BI group as well as cosmetic (78%) and physical (31%) in the AM group. The effects on psychosocial aspects were significant in the BI group regarding life changes and feeling like a "whole" person (68.9% vs 40.5% and 73.8% vs 40%). BI group also had a significantly higher satisfaction with overall cosmetic result, enlargement, and breast volume (93.4 %, 90.2%, 80% vs 69.4%, 70.2% vs 67% in AM group). Additionally, the BI group was more satisfied with shape, scar, and symmetry (90.1% vs 63.9%, 70.6% vs 40.5%, and 83.6% vs 54.0%, respectively).

Conclusions: None of our patient groups were stereotypical and motivation for surgery was primarily cosmetic in both groups. BI patients were significantly more satisfied with the aesthetic outcome and the QoL of many psychosocial aspects. AM patients may have had different expectations than BI patients and a significant dissatisfaction was reported in shape, scarring, symmetry, and the nipple-areola complex.

Level of Evidence: 3

Editorial Decision date: January 31, 2018; online publish-ahead-of-print February 22, 2018.

Research regarding the quality of life (QoL) among women who undergo aesthetic breast augmentation is expanding[1-18]; however, only a few studies have been published with data concerning postoperative QoL in augmentation mastopexy.[11,19,20] In 2004, Spear et al[11] discussed the more complex nature of both the patient's problems and the surgical procedure itself in augmentation mastopexy. The Spear et al[11] and Swanson[14,15] prospective outcomes studies evaluated and compared mastopexy, augmentation/mastopexy, and reduction from the patient's perspective. However, the Swanson study was biased by very short follow-up and lack of anonymity.

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Current generic breast questionnaires were not designed to assess surgical changes.[14] Pusic et al[21-23] have developed an outcome measure for breast surgery, the BREAST-Q questionnaire, which provides 3 general indices: breast satisfaction, psychological well-being, and sexual well-being. However, it does not provide data regarding the recovery experience or procedure-related questions that may be of clinical interest to the patient and surgeon.

We conducted a literature search on patient-reported data, including effects on patient satisfaction. In 2013 Kalaaji et al published results of an anonymous study about QoL in breast augmentation.[24] To our knowledge, no published study comparatively describes the quality of life results described by patients of breast augmentation and augmentation mastopexy using an anonymous method.

Published (and somewhat worrisome) data about women seeking breast surgery indicate that this patient group have documented a high incidence of psychiatric diseases, such as depression, and a high suicide rate.[25-29] This was not confirmed in a previous study of breast implant patients.[24]

The aim of this study was therefore, to draw comparisons between different aspects of Quality of Life between patients who underwent breast enlargement with implants and those who received augmentation mastopexy. We wanted to show the impacts both procedures had on the patient's life and to comment on reported changes. Furthermore, we wanted to know whether the complexity of and the results obtained with augmentation mastopexy differ from those with implants in regard to quality of life. We investigated patient characteristics, depression rate, motivation, and possible increase in postoperative QoL for psychosocial and cosmetic aspects between the two groups. Questions concerning age, relationship status, number of children, level of education, other epidemiologic aspects, and the effect procedures had on activities of daily living/work were included in the questionnaire.

METHODS

This retrospective study was conducted using the QuestBack return mail system (QuestBack AS, Oslo, Norway), which automatically processed survey answers anonymously and sent the results as diagrams to the authors. This system not only guarantees full anonymity to the patient, but also ensures unaffected results, thereby reducing bias. By registering the e-mail addresses of all our patients in our records, we could send the questionnaire by e-mail.

The authors created a questionnaire consisting of 47 validated questions regarding patient characteristics and epidemiologic background, mental health, activities of daily living/work, and psychosocial and cosmetic changes (Appendix A). Additional questions addressed patient motivation to undergo cosmetic surgery and whether the patient would recommend their procedure or a similar one to somebody else. Although the motivation for surgery is generally cosmetic as in all aesthetic surgery, it is important to include more specific reasons. Answer options for motivation were therefore divided to physical/practical (for example size difference made it hard to find bra, back and/or shoulder discomfort), emotional (reduced self-esteem, effects on the mood, and feeling confident, etc.), cosmetic (not satisfied with the appearance of the breasts), and intimate (in relation to partner). This questionnaire was first conducted as a means for our previously published article from 2013.[24] For our current study, we added specific questions concerning the augmentation mastopexy patients. The questionnaire was validated by a selected number of five patients. They were first contacted by telephone by one coauthor and asked to validate the questions via mail. Patients were asked to give feedback on the quality of questions, the questionnaire's length, and their comprehension. In addition, we also worked together with a professional language expertise to improve our questionnaire's quality. The authors followed Norwegian guidelines regarding consent, and the guiding principles from the Declaration of Helsinki. As mentioned above, the study was conducted anonymously and based upon our previously published article that used the same methods and followed Norwegian ethical guidelines as well. Hence, there was no need for this study to be further approved by an institutional review board. Patients were informed about the study beforehand by telephone and they gave their consent to us to use their answers anonymously.

The questionnaire for the AM group contained additionally specific questions (Table 1) regarding patient satisfaction with the results after surgery, such as the degree of lift, shape of the nipple and breast after surgery, and scarring. A total of 95 consecutive patients who underwent breast surgery at Oslo Plastic Surgery Clinic between January 2005 and January 2009 participated in the study: 61 patients who underwent breast enlargement with implants and 37 patients who underwent augmentation mastopexy. Over the four-year period we had 121 breast implant patients. The number of patients, who were e-mail reachable, had follow up for over one year, and were willing to participate in the study, was 93. Sixty-one (61) responded, giving us a response rate of 67%. For the augmentation mastopexy the overall patient number was 61. The number of patients who fulfilled our criteria was 42, and the response rate ended up as 88%. Patients who were followed up less than 1 year and those who were not reachable by e-mail were excluded. The indications for undergoing surgery were mainly hypoplasia mamma for the impant (BI) group. For the augmentation mastopexy (AM) group the indications were skin and/or glandular ptosis which required augmentation in addition to lifting.

Answers were graded on a 5-point scale: 1 (much worse); 2 (worse); 3 (as expected/no change); 4 (better), and 5 (much better). For the sake of statistical analyses, the scales were confined to 3 scales: lesser degree (1 and 2 were merged), no change, and greater degree (4 and 5 were merged).

Table 1. Specific Questions for the Mastopexy Augmentation Group Measured by Patient's Subjective Evaluation

Augmentation mastopexy			
How satisfied are you with the:	Lesser degree, n (%)	No change, n (%)	Greater degree, n (%)
Degree of lift after surgery	7 (19.5)	5 (13.9)	25 (66.7)
Location of the nipples	10 (27.0)	5 (13.5)	22 (59.4)
Size of the areola	7 (19.4)	5 (13.9)	25 (66.7)
Sensation of the nipples	10 (29.7)	7 (18.9)	20 (54.0)
Breast shape after surgery	8 (22.3)	5 (13.9)	24 (63.9)
Are the scars on the breasts as you expected	15 (40.5)	13 (35.1)	9 (24.3)

Regarding the operation, all operations were performed by one surgeon (the main author, A.K.). The submammary incision was used in the implant group. In the AM group the technique we used was vertical technique similar to Lejour/Lassus-type mastopexy with the nipple-areola sliding technique (superior pedicle) with lifting the deepithelialized lower pole around the implant up to the pectoral fascia fixating with polydiaxonone sutures then approximating the skin flaps vertically. Sometimes a minor excision of the gland in the lower part is performed when excess of it exists. The marking was mainly preoperative and could be adjusted minorly perioperatively. The pocket placement in both groups was either subglandular, submuscular, or subfascial.

The brand name of the round implants we used was McGhan Soft Touch Cohesive Gel-Filled breast implants (INAMED Aesthetics, Santa Barbara, CA). For shaped implant indications we used CUI Anatomical MicroCell Textured Cohesive Gel-Filled breast implants (INAMED Aesthetics).

Statistical Methods

The cross-tabulation of the responses of the patients by surgery group shows a small number in the resulting cells. The *P* values based on the usual asymptotic chi-square distribution are often biased. More suitable methods for testing statistical hypotheses according to statistical methodology in such tables are a category of tests commonly known as permutation tests.[30] The *P* values in these tests are based on the exact distribution of a statistical function of the responses under the hypothesis of equality of the groups or a Monte Carlo approximation of this distribution. In Tables 2 and 3 in which the responses are in nominal scale, the hypothesis of equality of surgery groups was tested with *P* values based on the exact distribution of the Pearson chi-square statistic. In Tables 4 to 6, in which responses are ordered, the *P* values for testing equality were based on the exact conditional distribution of Cochran-Armitage trend statistic. We used the R system for statistical computing, version 3.4.0 (R Core Team 2017, R Foundation for Statistical Computing, Vienna, Austria), and specifically the "coin" add-on package version 1.2–1.[31]

Table 2. Age of Patients

	Augmentation with implants, n (%)	Augmentation mastopexy, n (%)
<18 years	1 (2.0)	0 (0)
18-21 years	12 (20.4)	6 (15.2)
22-25 years	11 (18.4)	6 (15.2)
26-29 years	6 (10.2)	6 (15.2)
30-33 years	8 (14.3)	6 (15.2)
34-37 years	7 (12.2)	6 (15.2)
38-41 years	5 (8.2)	4 (12.1)
42-45 years	5 (8.2)	4 (12.1)
>45 years	3 (6.1)	0 (0)

$P = 0.7673$.

RESULTS

Patients

The response rate of the survey was 67% in the BI group (of 93 patients) and 88% in the AM group (of 42 patients). Average follow-up time was 2.8 years in both groups (range, 1-5.8 years). The age distributions in both patient groups are presented in Table 2.

The average age was 30 years (range, 18-59 years) in the BI group and 34 years (range, 20-59 years) in the AM group. There was no significant shift in location of the distributions in the two groups ($P = 0.767$). In the BI group, 33.5% of the patients had two children, 32.8% had no children, 19.0% had one child, and 10.3% had three children. In the AM group, most patients had two children (51.4%), and the percentage of women with

Table 3. Type of Work in Breast Augmentation Patient Population

	Augmentation with implants, n (%)	Augmentation mastopexy, n (%)
Physical/manual work	17 (28)	9 (24.3)
Office work	13 (22)	8 (21.6)
Physical/manual and office work	13 (22)	13 (35.1)
Work at home	5 (8)	3 (8.1)
Other	12 (20)	4 (10.8)

$P = 0.6059$ for testing independence between work category and operation group.

Table 4. Patient Motivation for Surgery[a]

	Augmentation with implants, n (%)	Augmentation mastopexy, n (%)
Cosmetic reasons	40 (65)	29 (77.8)
Emotional reasons	29 (48)	8 (22.2)
Intimate reasons	13 (22)	3 (8.3)
Physical reasons	6 (10)	11 (30.6)
Other	2 (3)	0

$P = 0.0057$ for testing independence between motivation category and operation group.
[a]Some patients gave more than one reason for surgery.

no children, one child, or three children was similar at approximately 10% each. Of those undergoing BI, 77.6% were in a relationship by the time of operation, whereas 22.4% were not. In the AM group, the percentage of patients in a relationship was slightly higher at 86.5%, whereas 13.5% of patients were not in a liaison. Regarding the completed level of education, the result is almost identical in both groups. For the BI group 53.4% had completed high school, and 36.2% had completed university/college. For the AM group the numbers were 51.4% and 29.7%. More than 75% of patients had finished high school or college in both groups. When it comes to patient careers, the results are evenly distributed between both groups. Options included manual work, office work, combined manual and office work, stay at home parent, and other. In the group who underwent AM, a slight majority constituted a choice of career in physical/manual and office work (35.1%) (Table 3); however, this was not significant ($P = 0.6059$). The distribution of annual patient income shows some differences. Of all patients who chose implants, 17.6% had an annual income higher than 50,000 USD, as did 29.9% of the patients who chose AM. The cost for a breast implant surgery is around 4500 dollars and for augmentation mastopexy around 6500 dollars. However, this is not the net worth of the patients in Norway, so it is affordable.

For the breast implant group, the percentage of anatomically shaped implant was 27.8%, and 72.2% for the round implants. The same percentage for augmentation mastopexy was 13.5% and 86.5%. For the breast implant group, the percentage of subglandular insertions was 46.9%, submuscular 42.9%, and subfascial 10.2%. The same percentage for the augmentation group was 45.2%, 51.6%, and 3.2%.

A limited number of patients were diagnosed with depression or were treated medically with antidepressants by the time of surgery: only 4 patients (6.9%) in the BI group and only 1 patient (2.7%) in the AM group. Out of the 4 in the BI group, 2 had no change, one improved, and one became worse. Unfortunately, the number is too small to perform any statistical analyses.

Motivation

When asked the following question, "Why did you choose to enlarge your breasts?" 65% of the patients in the breast enlargement group and 77.8% in the augmentation mastopexy group answered that they made their decision because of cosmetic reasons. Emotional reasons constituted 48% in the implant group and 22% in the augmentation mastopexy group. The differences were also obvious when it came to intimate and physical reasons: 22% and 8% as well as 10% and 31% in both groups (Table 4). These differences were statistically significant ($P = 0.0057$).

Psychosocial Changes

Herein, we analysed the psychosocial effects after surgery. The feeling that life had changed after surgery and feeling like a "whole" person was registered significantly ($P = 0.0042$) in the implant group. There was no significant difference in regard to feeling feminine or if the operation had affected social skills (Table 5).

Daily Activity and Work Activity

There were some positive effects in changes of motivation to perform daily activities and work in the breast implant group, but these changes were not significant. Approximately 72.1% of patients in the BI group and 89.2% in the AM group stated that they did not experience any noticeable changes in motivation to perform their daily activities (Table 6).

Cosmetic Results

The satisfaction in BI group (80%) was higher concerning breast volume in comparison with the AM group (67%).

Table 5. Psychosocial Changes

	Augmentation with implants			Augmentation mastopexy			*P* values*
To what degree do you feel:	Lesser degree, n (%)	No change, n (%)	Greater degree, n (%)	Lesser degree, n (%)	No change, n (%)	Greater degree, n (%)	
That life has changed	1 (1.6)	18 (29.5)	42 (68.9)	3 (8.1)	19 (51.4)	15 (40.5)	0.0042
Like a "whole" person	1 (1.6)	15 (24.6)	45 (73.8)	2 (5.87)	20 (54.3)	15 (40.0)	0.0012
Feminine	1 (1.6)	3 (5.0)	8 (93.4)	2 (5.4)	10 (27.0)	25 (67.5)	1
The operation affected your social skills	1 (1.6)	45 (73.8)	15 (24.6)	1 (2.7)	32 (86.5)	4 (10.8)	0.1491

**P* values refer to Cochran-Armitage test for equality of the ordered responses in the operation groups.

Table 6. Changes in Daily Activity, Work Activity, and Motivation

	Augmentation with implants			Augmentation mastopexy			*P* values*
To what degree do you feel that the operation has changed:	Lesser degree, n (%)	No change, n (%)	Greater degree, n (%)	Lesser degree, n (%)	No change, n (%)	Greater degree, n (%)	
Motivation for daily activity	1 (1.6)	44 (72.1)	16 (26.3)	0 (0)	33 (89.2)	4 (10.8)	0.1464
Motivation for work activity	1 (1.6)	52 (85.2)	8 (13.2)	0 (0)	36 (97.3)	1 (2.7)	0.2052
Effectiveness in work	1 (1.6)	54 (85.5)	6 (9.9)	0 (0)	36 (97.3)	1 (2.7)	0.4733

**P* values refer to Cochran-Armitage test for equality of the ordered responses in the operation groups.

However, this difference was not significant ($P = 0.291$). Patients from the BI group were statistically more satisfied with the shape of their breasts than patients in the AM group (90.1% vs 63.9%; $P = 0.0056$) (Figures 1 and 2).

Conversely, when it came to sensation of the skin on the breasts, the BI group scored 58.3% in satisfaction and the AM group scored 66.7%; nonetheless, the difference was not statistically significant ($P = 0.4661$). Patient satisfaction regarding scarring on the breast after the surgery was significantly higher in the BI group than in the AM group (70.6% and 40.5%, respectively; P value = 0.0006).

Symmetry of the breasts after surgery was also an important parameter of patient satisfaction. Patients from the BI group were generally more satisfied: 83.6% of patients in this group were satisfied to a greater degree with the symmetry of their breasts. Comparatively, only 54.0% of patients in the AM group reported that they were satisfied. Most of the patients in both groups were satisfied with the softness of their breasts after surgery: 88.5% in the BI and 75.0% in the AM group. The appearance of nipple and areola scored a higher level of satisfaction in the BI group (78% vs 60% in the AM group ($P = 0.0278$) (Figure 1).

Satisfaction with overall cosmetic result was very high, ranging from 93.4% in the BI group to a significantly lower but still high 69.4% in the AM group ($P = 0.0007$) (Figure 2). Satisfaction with overall enlargement was higher in the BI group (90.2%), whereas 70.2% of the patients in the AM group reported more overall satisfaction beyond enlargement ($P = 0.0041$) (Table 7).

Specific questions were only designed for the AM group with respect to satisfaction: 66.7% of the patients reported a great degree of satisfaction with the lift; 59.4% were very content with the location of the nipples; and 66.7% were very happy with the size of the nipples. Only about half of the patients (54.0%) reported a great degree of satisfaction regarding sensation in the nipples. When asked whether the scarring on the breasts was as expected, 75.6% of the patients answered, "to a lesser degree" or "no change in satisfaction" (Table 7). These were descriptive pieces of data and therefore statistical analysis was not performed.

Complications

Patients were also asked to comment on the complications which occurred after surgery. The following are the most common complications among both groups. BI patients reported a higher rate in "no complications" postoperative (78.1%) than AM patients (62.2%). BI had "Bleeding that leads to operation" in 1.7% vs 0% and "Rippling" in 15.3% vs 10.8%, respectively. Concerning "Capsular contracture that did lead to correction" it was noted as low incidence in both groups (1.7% vs 5.4%, respectively). While BI patients had no postoperative problems with seroma formation, 2.7% in the AM group experienced this complication. In our clinical records only two patients (3.2% and 5.4%, respectively) got an infection which needed to be treated. The patients in AM group expressed an incidence of "wound healing problems" (13.5%).

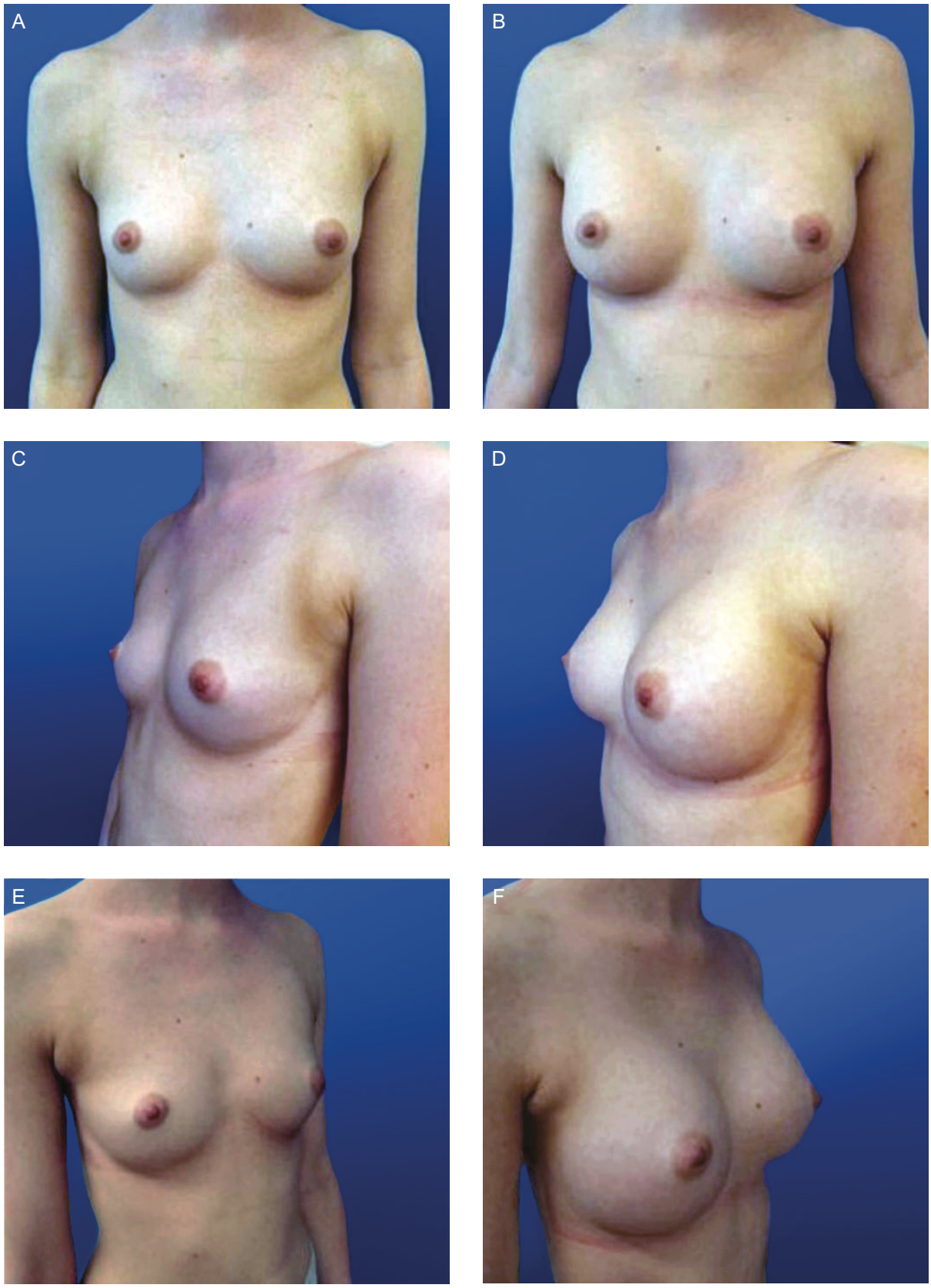

Figure 1. (A, C, E) This 25-year-old woman presented with moderate hypoplasia mammae before breast augmentation. (B, D, F) Twelve months after submuscular augmentation mastopexy with 275-gram silicone gel round implants.

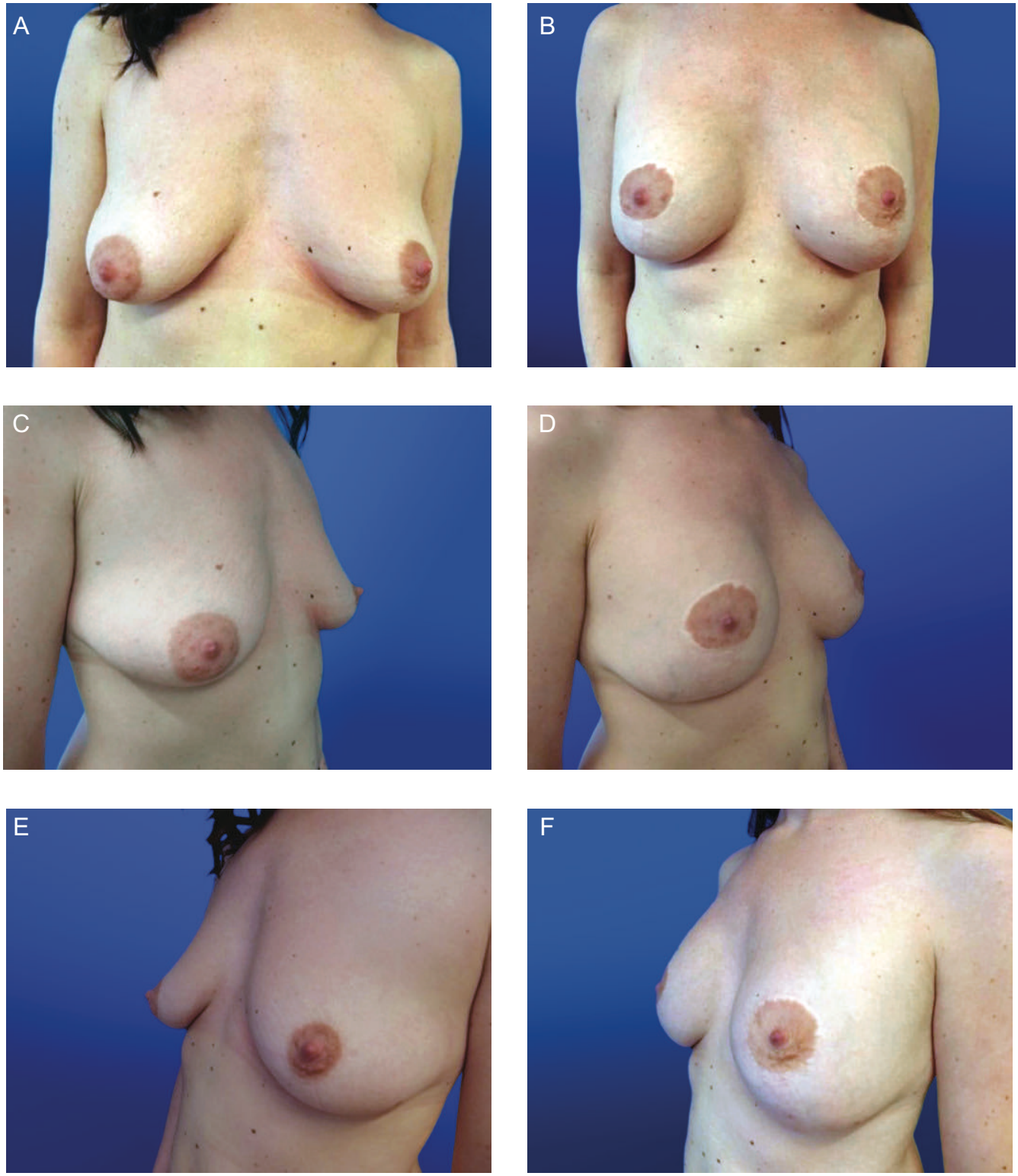

Figure 2. Average scar quality and cosmetic results after mastopexy augmentation. (A, C, E) This 29-year-old woman with mammary ptosis prior to undergoing augmentation mastopexy. (B, D, F) Two years after submuscular augmentation mastopexy with 240-gram silicone gel round implants. Both skin removal and gland lifting were performed. There is a tendency to have slightly bottomed out breasts, which is not uncommon in long-term results.

Table 7. Satisfaction in Cosmetic Changes

	Augmentation with implants			Augmentation mastopexy			*P* values*
To what degree are you satisfied with:	Lesser degree, n (%)	No change, n (%)	Greater degree, n (%)	Lesser degree, n (%)	No change, n (%)	Greater degree, n (%)	
Breast volume after operation	10 (16.4)	2 (3.3)	49 (80.3)	8 (21.6)	4 (10.8)	25 (67.5)	0.2911
Breast shape after operation	4 (6.6)	2 (3.3)	55 (90.1)	8 (22.3)	5 (13.9)	24 (63.9)	0.0056
Sensation of the skin on the breasts after operation	16 (26.7)	9 (15.0)	35 (58.3)	8 (22.2)	4 (11.1)	25 (66.7)	0.4661
Scars on the breasts after operation	9 (14.7)	9 (14.7)	43 (70.6)	18 (48.6)	4 (10.8)	15 (40.5)	0.0006
Symmetry between the breasts after operation	8 (13.1)	2 (3.3)	51 (83.6)	13 (35.1)	4 (10.8)	20 (54.0)	0.003
Softness of the breasts after the operation	2 (3.3)	5 (8.2)	54 (88.5)	4 (11.1)	5 (13.9)	28 (75.0)	0.0837
The nipple and the area around it after operation	5 (8.4)	8 (13.6)	46 (78.0)	9 (25)	6 (15)	22 (60)	0.0278
Cosmetic result as a whole	2 (3.3)	2 (3.3)	57 (93.4)	8 (22.2)	4 (11.1)	25 (69.4)	0.0007

**P* values refer to Cochran-Armitage test for equality of the ordered responses in the operation groups.

Expectations and Recommendation

When answering the question, "To what degree does the result match the expectations you had before surgery?" 89% of patients in BI group stated, "as expected or better," whereas 73% reported "as expected or better" in the AM group ($P = 0.0786$)

Furthermore, patients were asked whether they would recommend this type of surgery to a friend, based on their own experience: 82.5% of patients from the implant group and 64.9% of the patients from the AM group answered that they would. However, 15.8% vs 21.6%, respectively, said they would "maybe recommend" the procedure. The "no recommendation" alternative scored only 1.8% and 13.5%, respectively ($P = 0.01838$).

DISCUSSION

The aim of this study was to focus on the patient's outcome of satisfaction and to show the different impacts on quality of life among both patient groups after the procedure was performed. It is important to point out that the focus mainly law upon a quality of life comparison and our aim was not to compare surgical procedures. Reporting on different aspects in AM patients, which were not reported on before such as the aspects of patient's discontent, is a new field of research that will certainly provide new insights and guidelines for surgeons performing this procedure.

The motivation for undergoing surgery was primarily cosmetic in both groups. The BI group patients were significantly more satisfied with the final aesthetic result of their enlargement as well as their gain in quality of life. Their overall satisfaction with their result, their breast volume, shape, scar, and symmetry were significantly higher compared to the AM group patients. A significant dissatisfaction was reported in patients of AM regarding shape, scarring, symmetry, and the nipple-areola complex. It is maybe not surprising that the BI group was more satisfied with for example their scars since the scars are smaller compared to the scars in augmentation mastopexy. It is also possible to think that the reason the BI group is more satisfied with breast volume and shape is that they were not ptotic to start with. We mean that the satisfaction aspect is complex, hence the importance on asking these questions. Furthermore, there might be other factors for dissatisfaction in the BI group than only ptosis, such as not being satisfied with the shape due to a submammary fold, the form of the breast, and asymmetry to name some.

It is true, that some patients were blinded by a so-called unrealistic optimism resulting in less than expected results and thus minimizing their level of satisfaction. We therefore acknowledge that there is a stronger need for proper patient education preoperatively. Furthermore, we need to adjust standard protocols that will enable us to better select patients. Finally, there should be a stronger emphasis on patient revision and correction to minimize discontent in AM patients.

Psychosocial effects after surgery were presented by asking patient's if their feelings towards being a "whole" person had changed after surgery. Breast implant patients stated that surgery changed their life and made them feel like a "whole" person again. The description "whole" person integrates body, mind, and psyche and means that people are comfortable and satisfied with their appearance and physical traits. Any defect or abnormality is regarded

negatively and bothers their happiness resulting in a pessimistic perception of themselves.

The studies by Swanson[14,15] showed a high level of satisfaction with mastopexy patients. However, bias was unavoidable because the nurse who conducted the interview was not independent. Follow-up times in this study were comparatively short. Mean follow up was 3.9 months; however, some patients were interviewed as early as 1 month after surgery, particularly if it seemed unlikely that they would return for a follow-up appointment.

AM is more complex and surgically more challenging than BI.[11,14,21-23,32-36] The Spear et al[11] study on 13 AM patients concluded that aesthetic results for augmentation and mastopexy truly depend on many different factors that must work in harmony to yield an excellent result. Second, what is aesthetically pleasing to the surgeon may not be pleasing to the patient, and vice versa. Thirdly, although the patients' aesthetic results were good, they were not consistently rated as excellent, nor were the patients totally satisfied with their outcomes.[11] This perhaps reflects the more complex nature of both the patient's problems and the surgical procedure itself. Nipple/areola size and sensation, scars, breast size and shape, and symmetry are all key components in creating the desired breast with the adequate amount of lift. Enlarged areolae or bad scarring can worsen otherwise good results. Additionally, if scarring is acceptable but symmetry and appropriate shape are absent the results may suffer. However, the results were based on relatively few patients and on a nonanonymous study and aimed to evaluate the 1-stage augmentation mastopexy, which should show satisfactory results in size and lift, areolae, and softness.

We agree with these conclusions. This could explain the differences in satisfaction between the two groups given that the women in the BI group were generally more satisfied with the outcome. Furthermore, expectation of the result could be high and unrealistic in the AM group, resulting in less-than-expected scoring of the results after surgery. Therefore, it is considered indispensable for the surgeon in charge to inform the patient about realistic results and expectations and to ameliorate our techniques to more satisfy the patients in these regards.

The current study was built on what was previously published in 2013 for breast augmentation,[24] in which the same questions were used for the mastopexy augmentation group, which provides a good opportunity for comparison of consecutive patients whose surgeries were performed by the same surgeon.

The top motivational factor for undergoing surgery in both groups was cosmetic. This implies that these women were eager to change their physical attributes to make themselves look more attractive. These cosmetic changes were therefore firstly meant to improve their appearance. Second reason was emotional for the implant group and physical for the augmentation mastopexy. The statistically significant difference in satisfaction concerning cosmetic results in patients from the BI group compared with the AM group, regarding the shape of their breasts, scarring, symmetry of the breasts, and satisfaction with the nipple and areola illustrates the complexity of the augmentation mastopexy procedure and the need to better refine our used techniques in AM.

Because cosmetic motivation scored highest in both groups, the importance of cosmetic satisfaction is evident, even when the patient has two different diagnoses. The physical motivation for augmentation mastopexy could be explained by the discomfort women experience from ptotic breasts and the need to adjust the ptosis with a bra highlights the complexity of this condition for women. However, in the BI group, the second most common motivational factor for undergoing breast augmentation was emotional (ie, feelings of reduced self-esteem).[37-42] The little effect seen on daily activities and work activities in both groups could be explained by the fact that self-esteem in women tends to increase as they get older.[43,44]

Although some patients reported that they were diagnosed with depression or were treated with antidepressants, the depression rate in our study was still lower than the range in the general population in Norway, which is 7% to 17%.[24,27–29,45-52] It is important to keep in mind that that our sample size is relatively small. However, we have a 5 million population and we were merely stating the tendency in our sample compared to the Norwegian population. Putting together both groups (BI and AM) adds up to almost 100 patients and we can easily compare it to the depression rate in Norway, which is 7% to 17%.

Cosmetic results showed an improvement, though nonsignificant, in the BI group compared with AM group in terms of breast volume and the softness of the breasts after surgery. This could be explained because larger implants were not chosen in mastopexy, as this will accentuate hanging and the areola postoperatively. The improvement in softness reported in the BI group could be explained by differences in the quality of skin. Putting all these factors together, it was no surprise that the satisfaction with overall cosmetic results and with overall enlargement was significantly higher in the BI group than in the AM group.

A challenge for the surgeon is the relatively high percentage of reduced sensitivity in the skin of the breasts after surgery, which was seen in both groups.

The less favourable results with AM should encourage surgeons to provide better information to our patients, improve our techniques, and follow our patients with anonymous surveys to improve our results. Multicenter studies should be performed before conclusions can be made. Therefore, it is crucial to continue and expand research on this topic, especially when considering patient satisfaction, QoL, and the overall cosmetic result.

It does not come as a surprise that 89% of patients in the BI group stated, "as expected" or "better," while only 73% reported so in the AM group. This could be explained by higher expectations and/or the complexity of ptosis in the latter group. However, even with the less favourable results, the majority of patients would still recommend the mastopexy procedure to others. This shows us that the benefits of the procedure still overcome the nonfavourable aspect of the results.

The following study limitations were discovered: First of all, though some studies reported smaller samples, larger sample size than ours in both groups could be more representative of these patients. Secondly, we were not able to get hold of all patients in these two groups at our clinic. Some patients were not reachable via telephone or mail, therefore, we do not know whether they were satisfied or not with their cosmetic outcome and if their answers would have changed our results. Thirdly, the means of measurement used to collect data in the form of our questionnaire was suitable for answering questions related to quality of life but could be supplemented by the BREAST-Q to cover more aspects of the surgery. This will help to promote stronger an evidence-based approach for managing breast-surgery patients in further multicentre studies. Fourthly, the anonymity limits data interpretation, for example, implant volumes and resection weights are evidently not available, but this information is needed when comparing responses to questions concerning breast size and feel. Other valuable data related to implant type and placement are unavailable. However, we consider the anonymity to be a strength considering all answers from patients are completely honest. We agree though with the limitation. We could have done cross-tabulation for many of these variables. However, this would have taken us far from the main aim of the study. Alternatively, we could have divided the group into many subgroups, but this again would make the statistics unreliable because of the limitation of numbers.

Regarding skin sensations, the relatively higher level of satisfaction in the AM group can be explained by the fact that in some severe ptotic breasts with hypertrophy of the skin, the sensibility of the skin could be impaired. After surgery where excess skin is reduced it might give more regenerative effect to the cutaneous nerves so we would expect an improved sensibility as seen here in the AM group. However, the numbness after augmentation mastopexy is high and likely related to the superior pedicle technique.[53]

Concerning the high rate of self-reported complications, it seems the rate of complication in the AM group is high, however, this a patient reported outcome and not clinical one, and we feel patients tend to describe more freely minor problem like in wound healing as a major complication. The scar evidently is an area of concern for the patients and should be for us too to ameliorate our technique. Needless to say, this is anonymous study and patients feel free to report. The overall results are still thought satisfactory in doing the procedure.

CONCLUSIONS

The study included patients in both groups from a variety of backgrounds, age, socioeconomic status, and education level. Therefore, stereotyping of patients undergoing cosmetic surgery was not found in our two groups. Most patients were in a relationship and had children before the surgery. The depression rate was lower than in the general population in Norway in both groups. Motivation for undergoing surgery in both groups was topped by cosmetic reasons. Followed in second place by emotional reasons for the BI group and physical reasons for the AM group.

The effects on psychosocial aspects were significantly better in the BI group regarding the feeling that life had changed after the operation and feeling like a "whole" person. There was no significant difference when it came to feeling feminine or for social skills. Although there were some positive effects on daily life and work activities in the breast implant group, these changes were not significant. Improvement in breast volume and the softness of breasts after surgery was not significant in the BI group compared with the AM group. Greater satisfaction was significant in patients from the BI group compared with the AM group regarding the shape of their breasts, scarring, symmetry of the breasts, and the nipple and area surrounding.

Furthermore, satisfaction with overall cosmetic results and with overall enlargement was significantly higher in BI group than AM group. The less favourable results with AM show the importance of providing better information to our patients, improving our techniques, and following up with our patients using anonymous surveys to improve our results. Multicenter studies should be performed before final conclusions can be made. Therefore, it is crucial to continue and expand research on this topic, especially when considering patient satisfaction, QoL, and the overall cosmetic result.

Supplementary Material

This article contains supplementary material located online at www.aestheticsurgeryjournal.com.

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REFERENCES

1. Bruck JC, Kleinschmidt A, Ottomann C. Increased self-confidence and decreased sexual discomfort after subpectoral mammaplasty. *Handchir Mikrochir Plast Chir*. 2011;43(2):112-118.
2. Chahraoui K, Danino A, Frachebois C, Clerc AS, Malka G. Aesthetic surgery and quality of life before and four months postoperatively. *Ann Chir Plast Esthet*. 2006;51(3):207-210.
3. Tindholdt T, Mesic H, Tønseth KA, Harbo SO. Silikonbrystimplantater gjennom 40 år. *Tidsskrift Norske Lægeforening*. 2005;125:739-741.
4. Helsetilsynet-tilsyn med sosial og helse. Kosmetisk kirurgiske inngrep i Norge. *Rapport fra Helsetilsynet*. 2004;8:44-47.
5. Crerand CE, Infield AL, Sarwer DB. Psychological considerations in cosmetic breast augmentation. *Plast Surg Nurs*. 2007;27(3):146-154.
6. Fruhstorfer BH, Hodgson EL, Malata CM. Early experience with an anatomical soft cohesive silicone gel prosthesis in cosmetic and reconstructive breast implant surgery. *Ann Plast Surg*. 2004;53(6):536-542.
7. Hedén P, Boné B, Murphy DK, Slicton A, Walker PS. Style 410 cohesive silicone breast implants: safety and effectiveness at 5 to 9 years after implantation. *Plast Reconstr Surg*. 2006;118(6):1281-1287.
8. Klassen AF, Pusic AL, Scott A, Klok J, Cano SJ. Satisfaction and quality of life in women who undergo breast surgery: a qualitative study. *BMC Womens Health*. 2009;9:11.
9. Lamberg S, Manninen M, Kulmala I, et al. Health-related quality of life issues after cosmetic breast implant surgery in Finland. *Ann Plast Surg*. 2008;61(5):485-488.
10. Sarwer DB, Bartlett SP, Bucky LP, et al. Bigger is not always better: body image dissatisfaction in breast reduction and breast augmentation patients. *Plast Reconstr Surg*. 1998;101(7):1956-1961; discussion 1962.
11. Spear SL, Pelletiere CV, Menon N. One-stage augmentation combined with mastopexy: aesthetic results and patient satisfaction. *Aesthetic Plast Surg*. 2004;28(5):259-267.
12. Solvi AS, Foss K, von Soest T, Roald HE, Skolleborg KC, Holte A. Motivational factors and psychological processes in cosmetic breast augmentation surgery. *J Plast Reconstr Aesthet Surg*. 2010;63(4):673-680.
13. von Soest T, Kvalem IL, Roald HE, Skolleborg KC. The effects of cosmetic surgery on body image, self-esteem, and psychological problems. *J Plast Reconstr Aesthet Surg*. 2009;62(10):1238-1244.
14. Swanson E. Prospective outcome study of 106 cases of vertical mastopexy, augmentation/mastopexy, and breast reduction. *J Plast Reconstr Aesthet Surg*. 2013;66(7):937-949.
15. Swanson E. Prospective outcome study of 225 cases of breast augmentation. *Plast Reconstr Surg*. 2013;131:1158-1166; discussion 1167–1168.
16. Coriddi M, Angelos T, Nadeau M, Bennett M, Taylor A. Analysis of satisfaction and well-being in the short follow-up from breast augmentation using the BREAST-Q, a validated survey instrument. *Aesthet Surg J*. 2013;33(2):245-251.
17. McCarthy CM, Cano SJ, Klassen AF, et al. The magnitude of effect of cosmetic breast augmentation on patient satisfaction and health-related quality of life. *Plast Reconstr Surg*. 2012;130(1):218-223.
18. Swanson E. All Seasons vertical augmentation mastopexy: a simple algorithm, clinical experience, and patient-reported outcomes. *Plast Reconstr Surg Glob Open*. 2016;4(12):e1170.
19. Brinton LA, Brown SL, Colton T, Burich MC, Lubin J. Characteristics of a population of women with breast implants compared with women seeking other types of plastic surgery. *Plast Reconstr Surg*. 2000;105(3):919-927; discussion 928.
20. Swanson E. Prospective comparative clinical evaluation of 784 consecutive cases of breast augmentation and vertical mammaplasty, performed individually and in combination. *Plast Reconstr Surg*. 2013;132(1):30e-45e.
21. Pusic AL, Chen CM, Cano S, et al. Measuring quality of life in cosmetic and reconstructive breast surgery: a systematic review of patient-reported outcomes instruments. *Plast Reconstr Surg*. 2007;120(4):823-837; discussion 838.
22. Pusic AL, Reavey PL, Klassen AF, Scott A, McCarthy C, Cano SJ. Measuring patient outcomes in breast augmentation: introducing the BREAST-Q Augmentation module. *Clin Plast Surg*. 2009;36(1):23-32, v.
23. Pusic AL, Klassen AF, Scott AM, Klok JA, Cordeiro PG, Cano SJ. Development of a new patient-reported outcome measure for breast surgery: the BREAST-Q. *Plast Reconstr Surg*. 2009;124(2):345-353.
24. Kalaaji A, Bjertness CB, Nordahl C, Olafsen K. Survey of breast implant patients: characteristics, depression rate, and quality of life. *Aesthet Surg J*. 2013;33(2):252-257.
25. Javo IM, Sørlie T. Psychosocial predictors of an interest in cosmetic surgery among young Norwegian women: a population-based study. *Plast Reconstr Surg*. 2009;124(6):2142-2148.
26. Javo IM, Sørlie T. Psychosocial characteristics of young Norwegian women interested in liposuction, breast augmentation, rhinoplasty, and abdominoplasty: a population-based study. *Plast Reconstr Surg*. 2010;125(5):1536-1543.
27. Jacobsen PH, Hölmich LR, McLaughlin JK, et al. Mortality and suicide among Danish women with cosmetic breast implants. *Arch Intern Med*. 2004;164(22):2450-2455.
28. Sarwer DB, LaRossa D, Bartlett SP, Low DW, Bucky LP, Whitaker LA. Body image concerns of breast augmentation patients. *Plast Reconstr Surg*. 2003;112(1):83-90.
29. Sarwer DB, Brown GK, Evans DL. Cosmetic breast augmentation and suicide. *Am J Psychiatry*. 2007;164(7):1006-1013.
30. Strasser H, Weber C. On the asymptotic theory of permutation statistics. *Mathematical Methods of Statistics*. 1999;8:220-250.
31. Hothorn T, Hornik K, van de Wiel MA, Zeileis A. Implementing a class of permutation tests: the coin package. *J Statistical Software*. 2008;28(8):1-23.

32. Stevens WG, Macias LH, Spring M, Stoker DA, Chacón CO, Eberlin SA. One-stage augmentation mastopexy: a review of 1192 simultaneous breast augmentation and mastopexy procedures in 615 consecutive patients. *Aesthet Surg J*. 2014;34(5):723-732.
33. Swanson E. Breast reduction versus breast reduction plus implants: a comparative study with measurements and outcomes. *Plast Reconstr Surg Glob Open*. 2014;2(12):e281.
34. Stevens WG, Freeman ME, Stoker DA, Quardt SM, Cohen R, Hirsch EM. One-stage mastopexy with breast augmentation: a review of 321 patients. *Plast Reconstr Surg*. 2007;120(6):1674-1679.
35. Rohrich RJ, Rathakrishnan R, Robinson JB Jr, Griffin JR. Factors predictive of quality of life after silicone-implant explanation. *Plast Reconstr Surg*. 1999;104(5):1334-1337.
36. Murphy DK, Beckstrand M, Sarwer DB. A prospective, multi-center study of psychosocial outcomes after augmentation with natrelle silicone-filled breast implants. *Ann Plast Surg*. 2009;62(2):118-121.
37. Antoniuk PM. Breast augmentation and breast reduction. *Obstet Gynecol Clin North Am*. 2002;29(1):103-115.
38. Didie ER, Sarwer DB. Factors that influence the decision to undergo cosmetic breast augmentation surgery. *J Womens Health (Larchmt)*. 2003;12(3):241-253.
39. Gladfelter J, Murphy D. Breast augmentation motivations and satisfaction: a prospective study of more than 3,000 silicone implantations. *Plast Surg Nurs*. 2008;28(4):170-174; quiz 175.
40. Rubin LR, Klassen A, Cano SJ, Hurley K, Pusic AL. Motivations for breast surgery: a qualitative comparison study of breast reconstruction, augmentation, and reduction patients. *Breast J*. 2009;15(6):666-667.
41. Walden JL, Panagopoulous G, Shrader SW. Contemporary decision making and perception in patients undergoing cosmetic breast augmentation. *Aesthet Surg J*. 2010;30(3):395-403.
42. Kringlen E, Torgersen S, Cramer V. Mental illness in a rural area: a Norwegian psychiatric epidemiological study. *Soc Psychiatry Psychiatr Epidemiol*. 2006;41(9):713-719.
43. Robins RW, Trzesniewski KH, Tracy JL, Gosling SD, Potter J. Global self-esteem across the life span. *Psychol Aging*. 2002;17(3):423-434.
44. Orth U, Robins RH. The development of self-esteem. *Curr Dir Psychol Sci*. 2014;23(5):381-387.
45. Baumeister H, Härter M. Prevalence of mental disorders based on general population surveys. *Soc Psychiatry Psychiatr Epidemiol*. 2007;42(7):537-546.
46. Sandanger I, Nygård JF, Ingebrigtsen G, Sørensen T, Dalgard OS. Prevalence, incidence and age at onset of psychiatric disorders in Norway. *Soc Psychiatry Psychiatr Epidemiol*. 1999;34(11):570-579.
47. Lehtinen V, Sohlman B, Nummelin T, Salomaa M, Ayuso-Mateos JL, Dowrick C. The estimated incidence of depressive disorder and its determinants in the Finnish ODIN sample. *Soc Psychiatry Psychiatr Epidemiol*. 2005;40(10):778-784.
48. Leiknes KA, Finset A, Moum T, Sandanger I. Current somatoform disorders in Norway: prevalence, risk factors and comorbidity with anxiety, depression and musculoskeletal disorders. *Soc Psychiatry Psychiatr Epidemiol*. 2007;42(9):698-710.
49. Cole RP, Shakespeare V, Shakespeare P, Hobby JA. Measuring outcome in low-priority plastic surgery patients using Quality of Life indices. *Br J Plast Surg*. 1994;47(2):117-121.
50. Figueroa-Haas C. Psychological issues associated with breast augmentation. *Issues Ment Health Nurs*. 2009;30(6):377-382.
51. Lipworth L, Kjøller K, Hölmich LR, Friis S, Olsen JH, McLaughlin JK. Psychological characteristics of Danish women with cosmetic breast implants. *Ann Plast Surg*. 2009;63(1):11-14.
52. Ambro BT, Wright RJ. Depression in the cosmetic surgery patient. *Facial Plast Surg*. 2010;26(4):333-338.
53. Schlenz I, Rigel S, Schemper M, Kuzbari R. Alteration of nipple and areola sensitivity by reduction mammaplasty: a prospective comparison of five techniques. *Plast Reconstr Surg*. 2005;115(3):743-751; discussion 752.

Breast augmentation with own fat

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Introduction:

Fat grafting has been a well-known clinical method for reconstruction of small defects and recently applied in face, breast reconstruction and breast augmentation as an alternative to breast implants.

Patients:

Oslo Plastikkirurgi Clinic has, since 2008, carried out 38 breast enlargements with fat grafting on patients with hypoplasia mammae, asymmetry and in a few cases with mastopexy. The patients had to fulfill three criteria to become candidates for surgery: no use of foreign objects, existing fat to be corrected - not just a "donor site", and a realistic expectation of volume increase of the breasts.

Method:

Fat was usually harvested from the abdomen, thigh, buttocks or knee. The fat was machine-centrifuged for three minutes and grafted in intersecting and parallel canals through small incisions using Coleman's cannulas. A loose bra was used postoperatively. In recent patients we used a manual centrifuge and these patients (10 patients) are still under evaluation.

Results:

Average injected fat in left breast: 219 ml, right breast: 221 ml. Resorption rate was 40-60% in most cases, but 7 patients had more than 60%. Further injections were performed on three patients. Three more patients chose breast implants because there was not enough donor fat and/or because their expectation about breast volume with this method was not satisfactory. Two small cysts were observed.

Discussion:

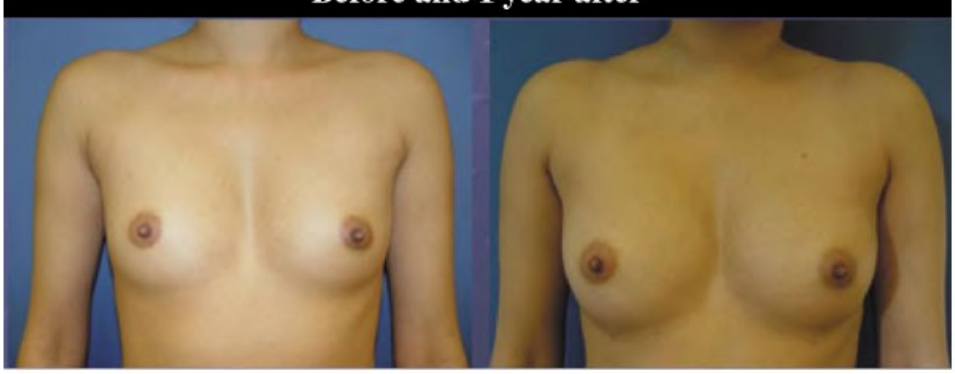
Patients obtained a natural feeling, better fullness in desired areas and have removed unwanted fat. However, far from all patients obtained the desired volume. Furthermore, it is rather difficult to calculate gained rest volume and some patients were disappointed by the resorption process, in contrast to the large breast volume seen directly after operation with the subsequent swelling. The method is still in the establishment phase. Factors like centrifugation, local anesthetics, cannulas used, preoperative expansion and injected fat amount still have an unclear effect on the final result.

Conclusion:

Provided that strict patient selection is applied, this method could be a good alternative for breast enlargement. A longer follow-up time and multicenter studies should be performed before final conclusions can be made.

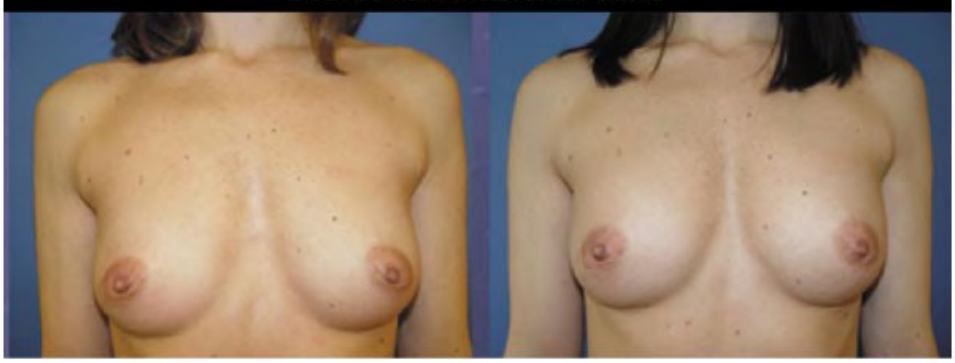
Editor's Note:
This report points out the importance of pre-expansion in grafts of more than 200 cc to the breast. The recipient site is choked because of interstitial pressure.

Before and 1 year after



174 ml right side, 150,5 ml left side

Before and 6 months after



246 ml right, 246 ml left side

Brystforstørrelse med eget fett: et godt alternativ til brystimplantater

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Introduksjon

Vincent Czerny var første kirurg til å ta i bruk autologt fettvev da han i 1895 utførte den første brystrekonstruksjonen med fett fra et lumbalt lipom (1,2). I 1909 ble autologt abdominalt fett høstet for å korrigere mangler i det malare området mens i 1926 utførte kirurg Charles Willy den første fett-transplantasjonen til den nasolabiale fold (3,4). I 1984 rapporterte Yves-Gérard Illouz om transplantasjon av fett til nye områder i ansiktet og i 1986 transplanterte Richard Ellenbogen fett til ansiktsdefekter (5,6,7). Fett-transplantasjon ble på 90-tallet en populær teknikk til bruk ved utfylling av ansiktsdefekter, samt til leppeforstørrelse. Kun i de siste ti årene har teknikken blitt brukt til totale brystrekonstruksjoner og estetisk brystforstørrelse som et alternativ til brystimplantat. Den moderne epoken av fett-transplantasjon ble videreutviklet av blant andre Coleman, Rigotti og Khouri (8,9,10,11,12,13).

Materiale og metoder

Totalt 56 pasienter med til sammen 68 forstørringer operert ved Oslo plastikkirurgi i perioden 2008-2013 ble inkludert i studien. Indikasjoner var hypoplasi mammae, asymmetri, asymmetri med mastopexy, asymmetri med abdominoplasti, eller tuberøse bryster. I den senere tid har teknikken blitt brukt i kombinasjon med implantat eller i forbindelse med fjerning av implantat.

Pasientene måtte oppfylle fem krav for å være egnet som kandidat til denne behandling:

1. Ikke ønske om fremmedlegemer
2. Ha eksisterende fett til korreksjon
3. Ha en realistisk forventning til volumøkning
4. Normal ultralyd/MR av bryst
5. Ingen i familien med brystkreft.

Det ble brukt to ulike metoder for å bearbeide innsamlet fett. I maskingruppen ble fettet sentrifugert i tre minutter med 3000 omdreininger pr minutt (1200 G) hos 24 pasienter (27 forstørringer). I manuellgruppen ble fettet manuelt sentrifugert i tre minutter med 15 G hos 32 pasienter (41 forstørringer), se Fig 1.

Fettet ble vanligvis høstet fra mage, lår, og sidene med 2,5-3,5 mm kanyler og transplantert i kryssende retninger gjennom små

Figur 1. Høsting av fett i et lukket system til spesiallaget kanister (beholder).

Tabell 1: Viser gjennomsnittlig mengde transplantert fett til begge bryst, over to seanser og med ulike sentrifugeringsmetoder.

Sentrifugeringsmetoder (antall)	Første seanse høyre (ml)	Første seanse venstre (ml)	Andre seanse høyre (ml)	Andre seanse venstre (ml)
Maskin G (24)	229 (55-358)	232 (166-360)	111 (75-150)	110 (75-146)
Manuell G (32)	235 (60-350)	227 (60-330)	126 (35-200)	117 (35-205)
Alle pasienter (56)	232	228	114	107

Tabell 2: Viser gjennomsnittlig oppfølging i måneder, antall re-transplantasjoner (2. seanse), implantatbruk og grad av tilfredshet mellom de to ulike sentrifugeringsmetodene.

Sentrifugeringsmetoder (Antall)	Gjennomsnittlig oppfølging (mnd)	2. seanse Nr	Implantat Nr	Tilfredshet etter første seanse** N (%)	Total tilfredshet etter endt behandling N (%)
Maskin G (24)	40 (27-68)	3	4	10 (50%)	13 (65%)
Manuell G (32)	22 (12-30)	9*	3	18 (64%)	23 (82%)
Alle pasienter (56)	31 (12-60)	12	7	28 (58%)	37 (77%)

* En tilhørte maskingruppen. Tre stk. fikk utført andre seanse selv om de i utgangspunktet var fornøyd etter første transplantasjon.
** Ingen oppfølging/ikke flere behandlinger hos fire pasienter i hver gruppe.

snitt utført med 1,4-2,5 mm kanyler. Prosedyren ble utført under TIVA (total intravenøs anestesi) og lokal anestesi. En løs BH som ikke presset oppover eller medialt ble brukt postoperativt. Pasientene fikk antibiotika profylakse (Keflex) i tiden enperioperativt.

Resultat

Gjennomsnittlig oppfølgingstid var 31 mnd. med korteste oppfølgningstid på et år. Transplantasjonsvolum var relativt likt mellom gruppene og mellom høyre og venstre bryst, men det var flere som gjennomgikk andre seanse i manuellgruppen og som fikk større volum.

Det ble satt inn proteser hos syv pasienter som ikke ønsket å gjennomgå prosedyren på nytt eller som ikke hadde nok fett.

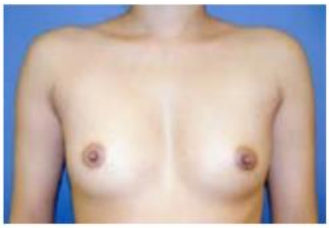
Fettet ble prosessert raskere i manuellgruppen noe som medførte at operasjonsvarigheten var kortere. Pasientene ble betydelig mer fornøyd (82 %) med resultatet i manuellgruppen sammenliknet med maskingruppen (65%), og også totalt sett (77%).

Det ble verken rapportert infeksjon eller asymmetri i etterkant av inngrepene. Som komplikasjon ble syv ukompliserte oljecyster rapportert. I tillegg oppsto én liten, benign kul. I ett tilfelle av mastopexi ble det observert noe fettnekrose i arret. (Fig. 2,3).

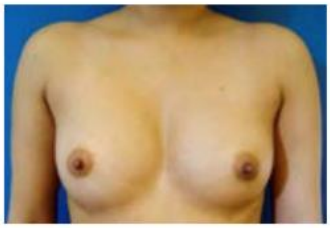
Diskusjon

De aller fleste av pasientene var positive til prosedyren fordi de oppnådde naturlig følelse i brystene, fikk fjernet uønsket fett og fikk bedre fylde i ønskede områder uten risiko for kapseldannelse. Likevel er det flere utfordringer man møter ved bruk av denne teknikken. Langt i fra alle oppnådde sitt ønskede brystvolum og en ser at det er vanskelig å måle økningen i volum. 3D volum imaging (Vectra™) kan brukes for å måle volumøkning, men har begrensende faktorer som kostnad og pasient compliance (14).

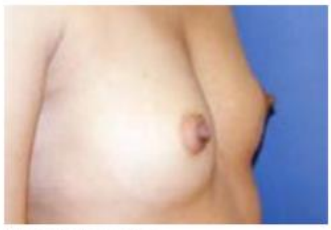
I vår studie ble fettcellene preparert med 15 G (Gravity force) sentrifugeringsgrad i manuellgruppen, i et nærmest lukket system, og 1200 G i maskingruppen. Vi tror disse faktorene kan forklare hvorfor den manuelle gruppen hadde et langt mer tilfredsstillende resultat da kvaliteten på fettcelene blir bedre bevart. Man ser også at faktorer som lokal anestesi, valg av ulike kanyler under operasjon, preoperativ ekspansjon og transplantert fettmengde er faktorer som kan gi usikker effekt på det endelige resultatet. (15,16)



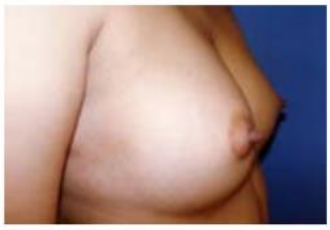
Forfra: før operasjon.



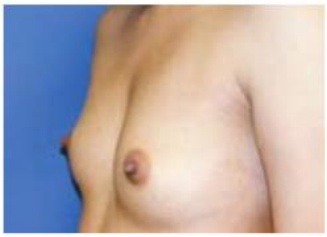
Forfra: 1 år etter operasjon.



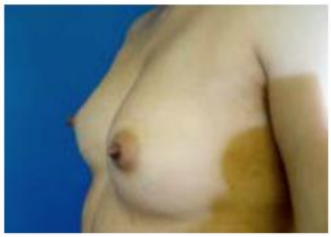
Høyre siden: før operasjon.



D. Høyre siden: etter operasjon.



E. Venstre siden før operasjon.



F. Venstre siden etter operasjon.

Figur 2. 29 år gammel kvinne med hypoplasi mammae og lett asymmetri. Høyre: 174 ml – venstre: 150 ml

Teknikken har lav komplikasjonsrisiko med tanke på infeksjon og asymmetri. Dette kan forklares med den atraumatiske teknikken og at resorpsjon er lik på begge sider da bearbeidelsen av fettet er likt. Når det gjelder oljecyster, fettnekrose og mikrokalsifisering er dette lett å spore og behandle. En studie fra Pittsburg University utført av Peter Rubin viser at med denne teknikken trenger en færre biopsier, færre etterkontroller og mindre bruk av MR og mammografi. Man ser i tillegg lav risiko for tumordannelse ved fettransplantasjon (17, 18).

Khouri bruker en jordbruksanalogi med de fire S'ene; soil, seeds, sowing og support når han forklarer hvordan en best tilrettelegger for brystforstørrelse med eget fett. Svakeste ledd vil kunne bestemme utfallet. Fettet må høstes med forsiktighet og transplantasjon utføres med multiaksial og flere-lags transplantasjon med diffus mikrotransplantasjon (11,12,19).

En laboratoriestudie har vist lovende resultater med fokus på bruk av plasma i lipoaspirat ved fettransplantasjon. (20)

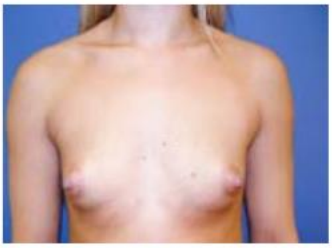
Stromal vascular fraction (SVF) (19) som er en del av fettvevet tatt ut ved fettsuging, inneholder en stor mengde "adipose derivate" stamceller (ADSC). Sammen med ulike tilvekstfaktorer kan det være at disse kan åpne et helt nytt vindu for plastikkirurgien i fremtiden.

Konklusjon

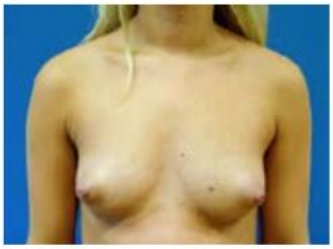
Brystforstørrelse med eget fett kan være et godt alternativ til implantat hos godt selekterte pasienter. Ut i fra vår studie (level 3 evidens) gir manuell sentrifugering et bedre resultat enn maskinsentrifugering når det gjelder pasient tilfredshet. Teknikken, som har lav komplikasjonsrisiko, er fortsatt i startfasen og det er flere faktorer ved fettransplantasjon som påvirker det endelige resultatet. Det anbefales at pasienten bør ha enda lengre oppfølgingstid enn i denne studien og vi avventer resultater fra flere studier og gjerne større multisenter-studier før endelig konklusjon kan bli gitt. Dette er en operasjonsteknikk som krever lang erfaring for å mestre og derfor anbefaler vi at denne type kirurgi utføres av erfarne plastikkirurger.

Interessekonflikt

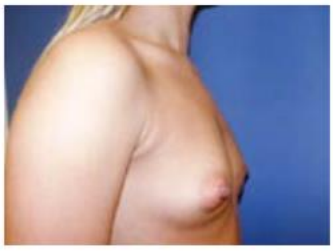
Ingen interessekonflikt foreligger hos noen av forfatterne. Ingen utenforstående finansiering ble brukt ved denne studien.



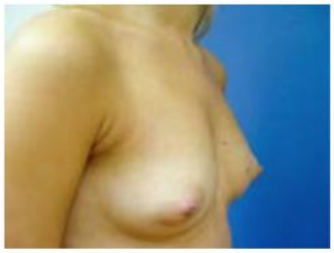
Forfra: før operasjon.



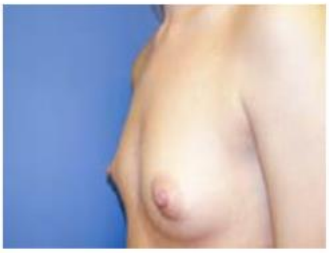
Forfra: 1 år etter operasjon.



C. Høyre siden: før operasjon.



D. Høyre siden: etter operasjon.



E. Venstre siden før operasjon.

F. Venstre siden etter operasjon

Figur 3. 22 år gammel kvinne med hypoplasia mammae og tuberøse bryst med lett asymmetri. Høyre: 254 ml, venstre: 240 ml.

Referanser:

1. Czerny V. Plastic replacement of the breast with a lipoma [in German] Chir Kong Verhandl. 1895; 2:216.
2. Uroskie Jr. T.W., Colen L.B. History of breast reconstruction. Semin Plast Surg. 2004 May; 18(2): 65-69
3. Markey, A. C. and Glogau, R. G. (2000), Autologous Fat Grafting: Comparison of Techniques. Dermatologic Surgery, 26: 1135–1139.
4. Fournier, P. F. (2000), Fat Grafting: My Technique. Dermatologic Surgery, 26: 1117–1128. –
5. Ellenbogen R, Motykie G, Youn A, Svehlak S, Yamini D Facial Reshaping Using Less Invasive Methods Aesth Surg J 2005; 25(2): 144.
6. Illouz, Yves-Gérard. Liposuction: The Franco-American Experience. Beverly Hills, Calif., USA: Medical Aesthetics, 1985. Print.
7. Illouz YG, Sterodimas A. "Autologous fat transplantation to the breast: a personal technique with 25 years of experience." Aesthetic Plast Surg. 2009 Sep; 33(5):706-15.
8. Coleman SR, Katzel EB. Fat grafting for facial Filling and Regeneration. Clin Plast Surg. 2015 Jul;42(3): 289-300
9. Kosowski TR, Rigotti G, Khouri RK. Tissue-Engineered Autologous Breast Regeneration with Brava-Assisted Fat Grafting. Clin Plast Surg. 2015 Jul;42(3):325-37.
10. Rigotti G, Marchi A, Micciolo R, Baroni G. Autologous fat grafting in breast cancer patients. Breast. 2012 Oct;21(5):690
11. Khouri RK, Khouri RK Jr, Rigotti G, Marchi A, Cardoso E, Rotemberg SC, Biggs TM. Plast Reconstr Surg. 2014 Apr; 133(4):796-807; discussion 808-9.
12. Khouri RK, Eisenmann-Klein M, Cardoso E, Cooley BC, Kacher D, Gombos E, Baker TJ. "Brava and autologous fat transfer is a safe and effective breast augmentation alternative: results of a 6-year, 81-patient, prospective multicenter study." Plast Reconstr Surg. 2012 May; 129(5):1173-87.
13. Delay E, Garson S, Tousson G, Sinna R. "Fat injection to the breast: technique, results, and indications based on 880 procedures over 10 years." Aesthet Surg J. 2009 Sep-Oct; 29(5):360-76.
14. Epstein MD, Scheflan M. Three-dimensional Imaging and Simulation in Breast Augmentation: What Is the Current State of the Art? Clin Plast Surg. 2015 Oct; 42(4):437-50.
15. Kaoutzanis C, Xin M, Ballard TN, Welch KB, Momoh AO, Kozlow JH, Brown DL, Cederna PS, Wilkins EG. Autologous Fat Grafting After Breast Reconstruction in Postmastectomy Patients: Complications, Biopsy Rates, and Locoregional Cancer Recurrence Rates. Ann Plast Surg. 2015 Jun 20. [Epub ahead of print]
16. Gale KL, Rakha EA, Ball G, Tan VK, McCulley SJ, Macmillan RD. A case-controlled study of the oncologic safety of fat grafting. Plast Reconstr Surg. 2015 May; 135(5):1263-75.
17. Strong AL, Cederna PS, Rubin JP, Coleman SR, Levi B. The Current State of Fat Grafting: A Review of Harvesting, Processing, and Injection Techniques. Plast Reconstr Surg. 2015 Oct;136(4):897-912.
18. Largo RD, Tchang LA, Mele V, Scherberich A, Harder Y, Wettstein R, Schaefer DJ. Efficacy, safety and complications of autologous fat grafting to healthy breast tissue: a systematic review. J Plast Reconstr Aesthet Surg. 2014 Apr; 67(4):437-48.
19. Khouri RK Jr, Khouri RE, Lujan-Hernandez JR, Khouri KR, Lancerotto L, Orgill DP. Diffusion and perfusion: the keys to fat grafting. Plast Reconstr Surg Glob Open. 2014 Oct 7; 2(9):e220.
20. Eto H, Suga H, Matsumoto D. "Characterization of adipose tissue structure and cellular components: differences between aspirated adipose tissue and excised adipose tissue." Plast Reconstr Surg (2009)124: 1087–1097.

Body Contouring

Gluteal Augmentation With Fat: Retrospective Safety Study and Literature Review

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Abstract

Background: Use of gluteal augmentation with fat increased by 3267% from 2002 to 2015, and the rate of death is highest compared with other aesthetic procedures: 1 in 3448 patients dies, compared with 1 in 55,000.

Objectives: To retrospectively investigate patients who underwent this procedure at Oslo Plastic Surgery Clinic, to review international data to determine factors causing mortality, and to provide guidelines for safety.

Methods: Patient data were searched for reason for the procedure, assessment of patients, techniques performed, and safety measures used. In 60 cases, a vibration machine was used for fat harvesting. Review of the international literature, with special emphasis on fatal complications, was performed on Medline, Google Scholar, and PubMed.

Results: Mean patient age was 32 years. Mean amount of grafted fat was 422 mL (range, 210-850 mL). Sedation, local and tumescent anesthesia were used in all patients, with mobilization directly after surgery. Mean operation time was 89 minutes. Eighteen patients required a second surgery. Minor complications occurred in 8 patients. Average follow-up was 8 months. Ninety percent of patients were satisfied. Review of international literature showed that the main reason for death in 2015 was fat lung embolism related to muscular and submuscular grafting.

Conclusions: Gluteal augmentation with fat is one of the most popular procedures, with an internationally high mortality rate. Patient safety is a priority, and preventive measures should improve safety because appropriate patient selection, avoiding muscular and submuscular grafting, avoiding infragluteal incision, moderate grafted volume, and direct postoperative mobilization are essential.

Level of Evidence: 4

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The Brazilian butt lift (BBL), the popular name of gluteal augmentation, was first introduced by Toledo in the 1980s and 1990s[1-5] and later performed by others.[6-8] Use of the gluteal fat grafting technique increased by more than 280% from 2011 to 2015[9-11] and by 3267% from 2002 to 2015.[12] Buttocks augmentation is now one of the fastest-growing aesthetic procedures in the United States.[13] According to the American Society for Aesthetic Plastic Surgery (ASAPS), more than 20,000 procedures were performed in 2016.[12] This popularity has led to a greater focus in the media, which has concentrated on the complications associated with gluteal augmentation using fat. Compared with the rate of death after other aesthetic procedures, which is estimated to be 1 in 55,000,[9] gluteal fat grafting has an alarming rate of 1 in 3448.[10] The risk for complications has stimulated research

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and publication of articles on this topic. Inflammatory news reports are almost a daily occurrence in the media.

This retrospective study was conducted to evaluate patients who underwent this procedure at the Oslo Plastic Surgery Clinic, Oslo, Norway, since 2014; to review international data to determine what factors might be causing the high mortality rate; and to provide guidelines to help eliminate or drastically reduce the death rate.

METHODS

Study Design

This retrospective study was conducted using consecutive patient medical records from the Oslo Plastic Surgery Clinic. A total of 44 patients who underwent gluteal augmentation using fat grafting at Oslo Plastic Surgery Clinic between December 2014 and October 2017 were included in the study. The study was conducted in accordance with the guiding principles of the Declaration of Helsinki.

Subjects

Eligible patients had to have been followed up for at least 3 months and have available medical records and photographs. The 44 patients, all women, underwent a total of 63 procedures, including second and third surgeries. Patient data were searched to extract reason for the procedure, assessment of the patients, techniques performed, and safety measures used.

Mean patient age at the time of operation was 32 years (range, 19-53 years) (Table 1). Body mass index (BMI) was within the normal range for 38 patients and was higher than normal in 6 patients (<30 mg/kg^2). Twenty-six patients had previously undergone plastic surgery. Reasons for augmentation were flat buttocks in 18 cases, congenital asymmetry in 3, congenital atrophy in 1, body contouring in 3, increasing gluteal volume in 19, and a combination of these in 6. Three patients underwent the procedure in combination with other procedures, such as breast augmentation with fat grafting (Table 2).

Preoperative Assessment

Evaluation included a full clinical examination, especially regarding BMI, which should be less than 30 kg/m^2. Patient weight should be adjusted before surgery, and weight should be stable for at least 6 months. Optimally, the patient should have an American Society of Anesthesiologists (ASA) score of 1 or 2. In our clinic, we map diseases for which the patient scores a 3 or 4. Anticoagulants are seldom an issue in patients who score 1 or 2 on the ASA; however, in rare cases, this requires individual assessment of indication and type of drug.

Table 1. Age Distribution of Patients

Age range, years	No. of patients (%)
18-20	2 (4.5%)
21-25	10 (23%)
26-30	11 (25%)
31-35	9 (20.5%)
36-40	4 (9%)
41-45	3 (7%)
>45	5 (11%)

Table 2. Reasons for Procedure

	No. of patients (%)
Wanting larger volume	19 (43%)
Flat buttocks	18 (41%)
Combination	6 (14%)
Congenital asymmetry	3 (7%)
Figure forming	3 (7%)
Congenital atrophy	1 (2%)

On the day of consultation, patient expectation is addressed. Areas to reshape or augment, or both, are discussed (eg, shaping the buttocks or gluteal area, augmenting these areas, or both). Using a mirror, the patient decides where the fat should be harvested from. It is important to avoid "fat hunting," or taking of fat from areas the patient has no need to correct because this could lead to unfavorable aesthetic effects in the donor area. Generally, patients complain about the abdomen; the sides and hip areas; the lower extremities, including the outer and inner thigh; and the inner knee.

A demonstration in the consultation room is made by drawing directly on the gluteal area of the patient, which will be divided into 4 quadrants: the upper left, upper right, lower left, and lower right. The fifth area that most patients want augmented is the lateral area at the continuation of the waist area toward the outer side of the thigh, most often because the skin has depressions. Incision lines are also shown to the patient. The anatomic shape and elasticity of the gluteal area, the patient's desire to enlarge, and the available fat in the donor sites help to determine the graft amount. An estimation of the limits of the procedure (what it can realistically achieve) is discussed with the patient before the operation (Figure 1). Two-dimensional images are created to illustrate the potential outcome; however, to keep patient expectations realistic, it is emphasized that this is only a simulation.

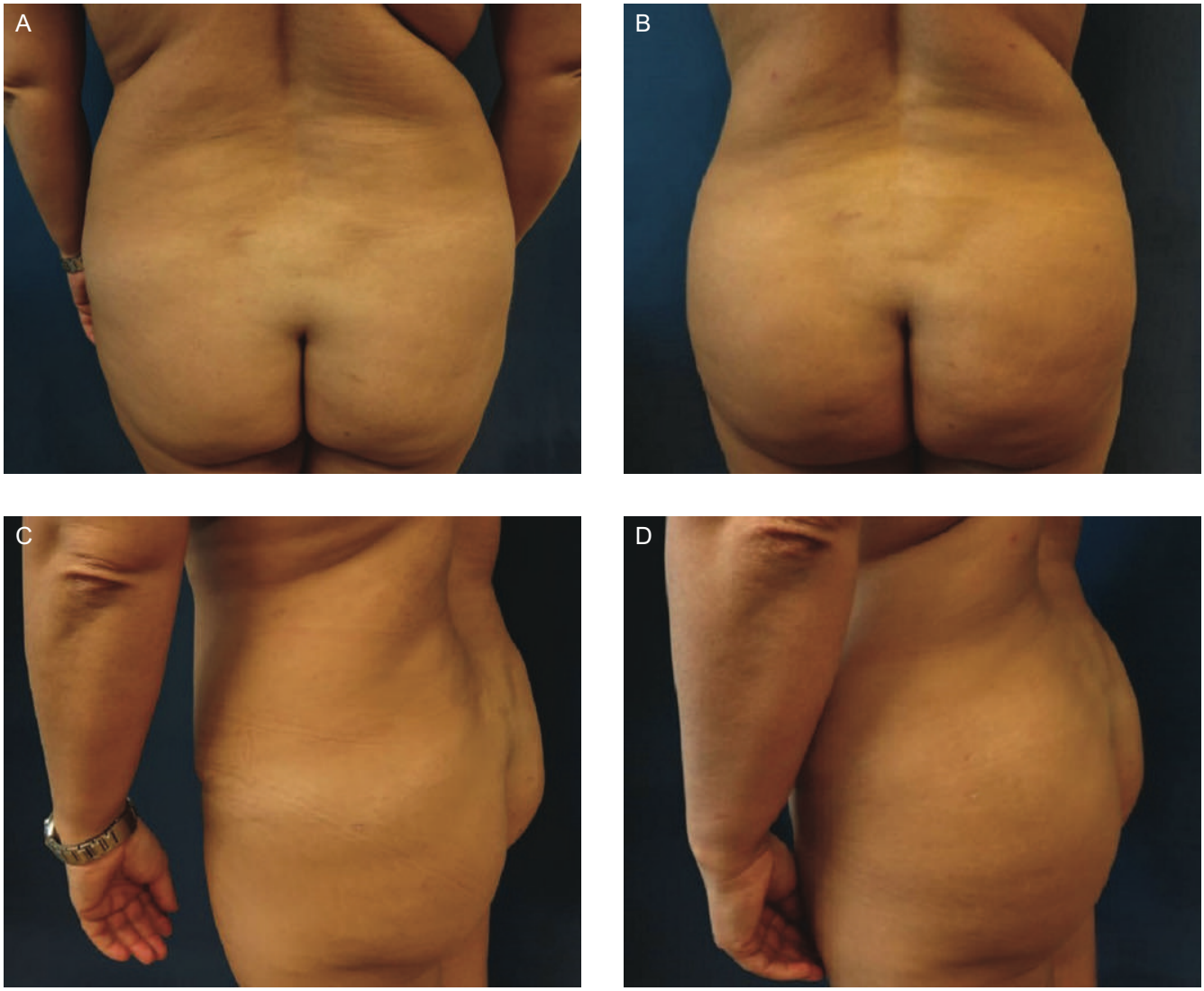

Figure 1. A 43-year-old woman with flat buttocks seeking gluteal augmentation preoperatively, (A) posterior and (C) lateral views. (B) Posterior and (D) lateral views 12 months after grafting 540 mL bilateral (total 1080 mL) and lateral view using MicroAire®.

Showing patients previous patient results is helpful: at least 5 different results and different indications to give the patient realistic expectations. Patient reaction to the images provides clues regarding the patient's motivation. The patient also often brings photographs from magazines to show desired results.

Expected consultation time is 30-40 minutes, not including the time necessary to fill out the patient information forms. Prescriptions for antibiotic and painkillers are written at the time the patient is scheduled to undergo surgery. A cooling-off period of at least 2 weeks before the procedure is important. It is also important to ask the patient how long he or she has been thinking about going through with the surgery to make sure it is not an impulse decision.

For patients who must travel longer distances to the clinic, a thorough consultation is conducted by video conference; health records and photographs are sent before this meeting. The assessment is the same as if the patients were in the clinic. Patients come 1 day before the scheduled operation for a thorough live consultation to make final decisions about the operation for the next day.

Anesthesia Assessment

The patient is sedated using monitored anesthesia care (MAC) until a level of moderate or deep sedation is reached per the ASA classification.[14] A Midazolam and Fentanyl intravenous bolus, combined with a Propofol infusion are used while the patient is spontaneously breathing and

receiving supplemental oxygen. The patient is monitored by electrocardiography, oxygen saturation, blood pressure, and capnography. This approach relies on use of a good local anesthetic. The Oslo Clinic uses tumescent lidocaine composed of 800 mg lidocaine and 1 mg epinephrine in 1000 mL saline (NaCl 0.9%). Tumescent lidocaine anesthesia is considered safe at doses of 28 mg/kg without liposuction and 45 mg/kg with liposuction.[15] The tumescent is warmed to 38°C to 40°C to avoid hypothermia and for the comfort of the patients.[16]

Operation Day

Preoperative Period

Premedication is given by the anesthesiologists and then the patient meets with the surgeon. A permanent marking is done to show where the fat will be taken from and where it will be transplanted (Figures 1 and 2). If there is a difference from what was agreed on during the consultation, whether augmentation or reshaping, the surgeon will reevaluate. New photos will be taken, and the patient will then be brought to the operating room. The temperature should be 22°C to 23°C to prevent hypothermia. If the donor area includes the abdomen, the patient must lie supine. Unless there is an indication to use perioperative leg garments, such as with obese immobilized patients, they are not used.

Intraoperative Period

Preparation and draping of the patient is important to avoid compromising sterility when turning the patient. The amount of lipotumescent equals the expected amount of fat extraction. After inducing sedation in a sterile environment, lipotumescent is injected into the donor areas. After 15 minutes, harvesting of the fat is started. This allows for equalized pressure on the fat and prevents unwanted irregularities if only 1 or 2 holes are made.

Positioning

After positioning for lipoaspiration, possibly supine position if taking fat from the abdomen, the patient is placed in a prone position when gluteal augmentation is to be performed. While placing patients in this position, avoid bending the patient's knees to avoid lower extremity venous stasis, which increases the risk for deep venous thrombosis. This prone position allows for greater control and safety, with use of the grafting cannulas from supragluteal and lateral incisions into more of a subcutaneous plane. Straight cannulas are used to better control the direction of the grafting.

Harvesting and Processing the Fat

The fat is extracted in a closed system into a canister of 0.5, 1, or 2 liters, depending on the amount planned for extraction. The operation should be efficient and performed in the shortest possible time to ensure the best quality of fat, to reduce the time of exposure of the patient, and lessen the possibility of complications. It is unnecessary to wait for the local anesthetics to be effective because they usually have already taken effect in the first area by the time injection in the last area is finished. The MicroAire system is used for harvesting fat. While switching off the pressure from the canister, the incision of the donor sites is sutured with 5.0 polyglactin 910 and additional tape. During that time, decanting of the fat is done in 10 minutes to separate blood from fat. If the patient must be turned over to a prone position, this is also done now. The anesthesiologist lightens the total intravenous anesthesia so the patient wakes up and can help with changing of position. Local anesthetic is always applied to the incision line and a 1- to 2-mm incision is made with a No. 11 blade.

About 50 mL of lipotumescent is infiltrated with low pressure to the gluteal areas to prepare the recipient sites. When the connection is tight between the skin and the underlying layers, a vibration cannula is used. Supragluteal and upper lateral incisions are used. When the Oslo Clinic first started performing this procedure, an infragluteal incision was used; however, with the risk correlated with this placement, this entry incision has been discontinued and only supragluteal and lateral incisions are used because they are safer. Furthermore, an internates incision is not used because of the low hygiene quality in this region. Subgluteal incisions are also no longer used at the Oslo Clinic because it is easy for the cannula to be tilted back to the greater sciatic foramen. Upper and lateral incisions are used, 2 or 3 per side.

Reshaping is done on one side and one area at a time and then compared with the other side so the shaping is complete before beginning augmentation. The grafting should be stopped when the skin changes color to white or if the fat overruns the injection sites. In most cases, grafting is avoided from the lower part of the buttocks because the patient seldom asks for this and, by putting more fat in that area, more skin will hang postoperatively. Patients usually want to augment the upper part and fill the depression laterally.

A 4-mm or 5-mm cannula is used for harvesting, with 3 holes equally distributed around the diameter to equalize the pressure on the donor site. Grafting level is always subcutaneous and suprafascial; there is no muscular or submuscular grafting. The grafting cannula is a 3-mm blunt 1-hole cannula at the tip; the opening goes in the transfer direction, with a diameter to equalize the distribution of the grafted fat. The Oslo Clinic started to use a 4-mm cannula after recommended guidelines in 2017 to enhance the safety of the procedure.

The anesthesiologist notes the anatomic position and amount (in milliliters) of fat injected on a sheath; a syringe

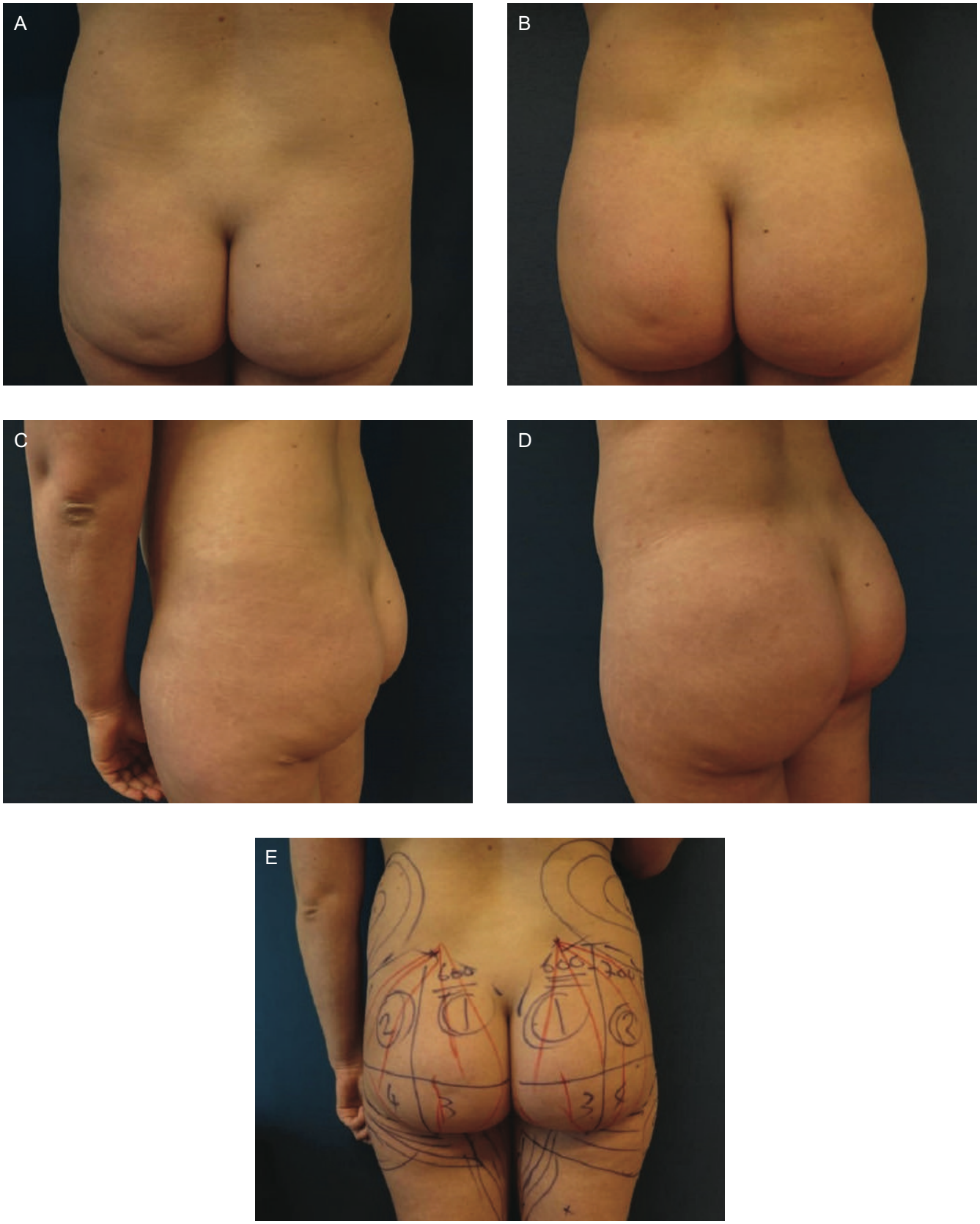

Figure 2. A 24-year-old woman with flat buttocks seeking gluteal augmentation preoperatively, (A) posterior and (C) lateral views. (B) Posterior and (D) lateral views 12 months after grafting 500 mL per side mostly in the upper and lateral part (total 1000 mL) using MicroAire®. (E) Preoperative planning where the donor sites and grafting directions are marked.

of 50 mL at a time is grafted. Hydrogen peroxide is applied to all incision lines, followed by 5.0 or 6-0 polyglactin 910 sutures and tape.

Postoperative Period

A pressure garment is applied to the patient while he or she is on the operating table, and pressure on the fat is reduced by making a window in the garment over the gluteal area. The patient is awoken by discontinuing anesthesia and then helped to the recovery room, where he or she will lie in the prone position. Patients stay between 1 and 2 hours to make sure they are totally awake and have been eating and drinking. An adult always accompanies the patient and must be with the patient the first 24 hours. The patient is encouraged to walk around from day 1 to reduce any mobility problems. An antibiotic (cephalexin) is given for 3 days, starting from the day before surgery. Follow-up is always the day after surgery. Patients must not fly for at least 2 days (short flight less than 2 hours) to 1 week (long flight, more than 2 hours). Follow-up periods are at 2 weeks, 3 months, 6 months, and 1 year. If the result is not satisfactory, a second operation is performed. This subsequent procedure might have been planned in advance because of tightness of skin and/or lack of fat. The Oslo Plastic Surgery Clinic has a 1-year guarantee of satisfaction or additional surgery is free of charge, so patients can ask for new augmentation or correction. This can contribute to reliable results. Figures 1 and 2 show examples of average results with varied follow-up and indications after augmentation using fat.

Review of International Literature

Medline, Google Scholar, and PubMed searches were performed, with special emphasis on recent literature regarding fatal complications, which started to appear in 2015. All relevant literature that focused on complications, especially mortality, was searched. No exclusion criteria were defined because the information on mortality is crucial even if statistically it was not possible to be included in a comparison with other studies as in Cárdenas-Camarena et al mortality reports,[17] which were not included in the meta-analyses of Conde-Green.[18]

RESULTS

Retrospective Study

Average age at the time of operation was 32 years (range, 19-51 years) (Table 1). Thirty-eight patients had a normal BMI, and 6 patients had a higher BMI (<30 mg/kg^2). Reasons for the first procedure were flat buttocks in 18 patients, congenital asymmetry in 3 patients, congenital atrophy in 1 patient, figure forming in 3 patients, and increase of volume in 19 patients. Six patients had a combination of these reasons. For the 18 patients undergoing a second procedure, reasons were a desire for larger gluteal volume in 12 patients and correction of asymmetry in 6 patients. In 60 cases, MicroAire was used for harvesting, whereas the Nouvag Vacuson 60 LP liposuction system was used in 2 cases, and a manual syringe was used in 1 case. Patients were mobilized directly after surgery.

Mean operation time was 89 minutes for the first surgery (range, 55-150 minutes) and 57 minutes for the subsequent operation (range, 40-109 minutes) (Table 3). The mean amount of grafted fat in the first session per side was 422 mL on the right and 419 mL on the left. The most grafted fat in the first session was 850 mL, and the least was 210 mL. In the second surgery, the mean amount of fat grafted per side was 153 mL on the right side and 137 mL on the left side, ranging from 50 to 285 mL (Table 3). In the third surgery, 100 mL of fat were grafted per side. Only 1 patient underwent a third procedure. The second surgery used less mean volume for several reasons. The request for enlargements was mainly met after the first session, and only small adjustments in certain areas were further required. In addition, in some patients, there was not enough residual fat to harvest the second time. Eight (around 13% of all procedures) patients (all 63 procedures included) experienced minor complications: 3 felt nausea and dizziness, 2 had a reaction to anesthesia, 2 had swelling and bruises, and 1 required urinary catheterization. Complications were treated successfully (Table 4).

Sedation in combination with local anesthesia was used in all 44 patients; local anesthesia by itself was not used. Average follow-up was 8 months for the first surgery (range, 3-18 months) and 5 months for the second surgery (range, 3-11 months). Assessment of satisfaction included only the patients who were followed up for 6 months or more. Ninety percent of patients were satisfied with the results (Figures 1 and 2).

Reported Complications in the International Literature

In a meta-analysis performed by Condé-Green et al,[18] the authors analyzed the published techniques of gluteal fat augmentation and identified those of potential concern. Their results after studying 17 case series and 2 retrospective studies, which included 4105 patients from Colombia, Mexico, and Brazil who had a mean of 400 mL decanted lipoaspirate injected into each gluteal region, showed that most patients were very satisfied with their results. With a 7% mean complication rate, the results showed no significant correlation to the planes of injection. Condé-Green et al concluded that fat grafting was an "effective and

Table 3. Mean Operation Time (in Minutes) and Mean Amount of Fat Grafted (in Milliliters)

	First session	Second session
Mean operation time, minutes	89 (range, 55-150)	57 (range, 40-109)
Mean fat grafted, mL, left side	419 (range, 210-850)	137 (range, 50-285)
Mean fat grafted, mL, right side	422 (range, 210-850)	153 (range, 50-285)

Table 4. Complications After Gluteal Augmentation with Fat

Complication(s)	No. of patients (%)
Nausea and dizziness	3 (5%)
Reaction to anesthetics	2 (3.2%)
Minor swelling and bruises	2 (3.2%)
Urinary retention	1 (1.6%)
Skin necrosis/compartment syndrome	0 (0%)
Pulmonary embolism	0 (0%)

predictable way to remodel gluteal regions," but agreed that the procedure had risks that could be avoided by preventing fat embolism by avoiding gluteal vessel damage. They stated that analysis and systemization of the procedure and reporting of cases in the fat grafting registry would aid in optimization of outcomes.

Oranges et al[19] published a comprehensive literature review on the techniques of gluteal augmentation in 2017. The aim was to study the overall complications and satisfaction rates associated with the broad spectrum of techniques. They used *a priori* criteria to review clinical studies involving gluteal augmentation techniques from a search of PubMed/Medline. They found 52 studies, representing 7834 treated patients, and found 5 gluteal augmentation techniques were used: gluteal augmentation with implants (n = 4781), autologous fat grafting (n = 2609), local flaps (n = 259), hyaluronic acid gel injection (n = 69), and local tissue rearrangement (n = 6). Their results showed that the overall complication rates were 30.5% for gluteal augmentation with implants, 10.5% for autologous fat grafting, 22% for local flaps, and 39.1% for hyaluronic acid gel injections. A high satisfaction rate was reported for all 5 techniques. Autologous fat grafting had the lowest complication rates but included serious major complications, such as 4 cases of fat embolism and 1 death, which was related to fat embolism.

In 2016, Sinno et al published an article[20] for which the authors searched through the PubMed, Medline, and Cochrane databases in April 2015 for studies that achieved buttocks augmentation using silicone implant placement or autologous lipoinjection. Complication outcomes of interest included wound dehiscence, infection, seroma, hematoma, asymmetry, and capsular contracture. Forty-four articles met inclusion criteria. The most commonly reported complications in 2375 patients who received silicone implants were wound dehiscence (9.6%), seroma (4.6%), infection (1.9%), and transient sciatic paresthesia (1.0%), with an overall complication rate of 21.6% (n = 512). The most commonly reported complications in 3567 patients receiving autologous fat injection were seroma (3.5%), undercorrection (2.2%), infection (2.0%), and pain or sciatalgia (1.7%), with an overall complication rate of 9.9% (n = 353). Patient satisfaction after surgery was assessed differently among studies and could not be compared quantitatively. Sinno et al[20] concluded that, although gluteal augmentation was once reported to have complication rates as high as 38.1%, a systematic review of the 2 most popular techniques showed substantially lower overall complication rates. The overall complication rate with autologous fat grafting (9.9%) was lower than that with silicone buttocks implants (21.6%). Sinno et al stated that a standardized method of measuring patient satisfaction was necessary to fully understand outcomes of these increasingly popular procedures.

Alarming data were found in an article by Cárdenas-Camarena et al,[17] published 1 year previously (not included in the previous meta-analyses because of statistical issues). Cárdenas-Camarena et al made an analysis of secondary deaths from gluteal augmentation procedures performed in Mexico and Colombia over a period of 10 and 15 years, respectively. In Mexico, the study was performed through a survey of all members of the Mexican Association of Reconstructive, Plastic, and Aesthetic Surgery. In Colombia, the study was performed through an analysis of deaths and autopsies documented by the National Institute of Legal Medicine and Forensic Sciences Regional Bogotá. The results showed that 413 Mexican plastic surgeons reported 64 deaths related to liposuction, with 13 deaths caused by gluteal lipoinjection. In Colombia, 9 deaths were documented. Of the 13 deaths caused by gluteal lipoinjection in Mexico, 8 (61.6%) occurred during lipoinjection, whereas the other 5 (38.4%) occurred within the first 24 hours after lipoinjection. In Colombia, 6 deaths (77.7%) occurred during surgery and 3 occurred (22.2%) immediately after surgery. In the Colombian autopsy results, 7 cases of macroscopic fat embolism and 2 cases of microscopic embolism were reported, with abundant fatty tissue in the infiltrated gluteal muscles. In the study by Cárdenas-Camarena et al, the authors found that intramuscular gluteal lipoinjection was associated with death caused by gluteal blood vessel damage, allowing macroscopic and microscopic fat embolism; therefore, buttocks lipoinjection should be performed very carefully, avoiding injection into deep muscle planes.

In autumn 2016, more alarming reports of rates of death came from the Aesthetic Surgery Education and Research

Foundation (ASERF) Task Force, followed by a published article in March 2017 by Mofid et al.[9] Mofid et al sent an anonymous web-based survey to 4843 plastic surgeons worldwide, with the aim of determining the incidence of fatal and nonfatal pulmonary fat embolism associated with gluteal fat grafting and providing recommendations to decrease the risks associated with the procedure. Additional data on morbidity and mortality were collected through confidential interviews with plastic surgeons and medical examiners, public record requests for autopsy reports in the United States, and the American Association for the Accreditation of Ambulatory Surgical Facilities (AAAASF). Results were as follows: 692 surgeons who responded to the survey reported 198,857 cases of gluteal fat grafting. Over their careers, surgeons reported 32 deaths from pulmonary fat emboli and 103 nonfatal pulmonary fat emboli. Three percent (3%) of respondents experienced a patient death and 7% of respondents reported at least 1 pulmonary fat embolism in a patient over their careers. Surgeons reporting the practice of injecting into the deep muscle experienced a significantly increased incidence rate of fatal and nonfatal pulmonary fat emboli. Twenty-five deaths were confirmed in the United States over the past 5 years through autopsy reports and interviews with surgeons and medical examiners. Four deaths were reported from 2014 to 2015 from pulmonary fat emboli in AAAASF facilities. Mofid et al[9] concluded that, despite the growing popularity of gluteal fat grafting, significantly higher mortality rates than with any other aesthetic surgical procedure seemed to be associated with gluteal fat grafting. Based on this survey, fat injections into the deep muscle, use of a cannula smaller than 4 mm, and pointing of the injection cannula downward should be avoided. They also added that more research is necessary to increase the safety of this procedure.

In November 2017, it was stated again that buttocks augmentation is one of the fastest growing aesthetic procedures in the United States. According to ASAPS, more than 20,000 procedures were performed in 2016 alone, (a 3267% increase over 2002, when ASAPS first began tracking statistics for buttocks augmentation).[12] ASAPS began tracking fat grafting to the buttocks in 2015, and for 2 years it collected those data: an average of 91% of all buttocks augmentation procedures have consisted of fat grafting. Recently, ASERF formed the Gluteal Fat Grafting Task Force to investigate the risks associated with this increasingly popular procedure. The task force comprised board-certified plastic surgeons and identified factors that either added risk or proved to be protective and/or preventative. These findings[12] were published in the *Aesthetic Surgery Journal* and have led to the adoption of the certain recommendations, such as avoiding injecting fat into the deep muscle, use of a equal or >4 mm single-hole injection cannula, avoiding downward angulation of the cannula, positioning of patient, and placing incisions to create a path that will avoid deep muscle injections. They recommend additionally to maintain constant 3-dimensional awareness of the cannula tip, injecting with the tip always in motion, reviewing gluteal vascular anatomy and drawing landmarks to identify and avoid injection into the pedicle, considering pulmonary fat embolism in unstable intraoperative and postoperative patients, and including risk for fat embolism and surgical alternatives in the informed consent process.

An additional example of a study with a focus on complications and death after liposuction procedures is by Vongpaisarnsin et al.[21] Their research mainly focused on death after cosmetic liposuction and gluteal augmentation caused by septicemia with *Pseudomonas aeruginosa*. In addition, they made a summary of the most common complication types.

As recently as January 2018, after reports of 3 deaths in Florida alone, the task force issued a safety advisory on gluteal fat grafting. It offered suggestions such as staying away from gluteal veins and the sciatic nerve, grafting fat from superficial planes only (subcutaneous as safest), concentrating the cannula tip throughout every stroke to ensure no deeper pass, avoiding deep angulation, using instruments that offer control of the cannula, and injecting only while the cannula is in motion to avoid high-pressure bolus injection.[9,22-24]

DISCUSSION

The aim of this retrospective study was to investigate patients who underwent gluteal augmentation using fat at the Oslo Plastic Surgery Clinic, but also to review international data within this field. We are aware of the short follow-up time, and we could have waited for late results. However, the concerns here were for safety and surviving the procedure, with only minor complications or no complications. Although our study represents a small sample of patients, in our opinion, this number (63 cases) is adequate for basing observation and provides sufficient power.

In 2017, Nahai[24] articulated the hurdles and challenges when dealing with the high rate of death. He stated, "While I will exercise my very best surgical judgment based on the latest available information, my experience with this procedure is no guarantee that serious complications or death cannot occur." We should never place ourselves or our patients at risk. The risk is well known now and occurs with muscular and submuscular grafting, large-volume grafting, poor patient selection, and deficiency in perioperative technique. It is our responsibility to stay in the safe zone, not on the borderline.

Although the procedure has been done for many years, since the 1980s and 1990s, it first became popular at the start of this century, from 2000 to 2010. The biggest breakthrough came after 2011 and is still occurring. The first

alarming information came in 2015, with reports of a high rate of death. However, although many meta-analysis studies were performed in 2015 and 2016, no alarm was raised in the plastic surgery community until the work of ASERF and publication thereafter in 2017. During those years, stigma was associated with this procedure, and, although there are no statistically credible data, the complications continued. A network is needed to check all reports of fatalities and severe complications in aesthetic procedures and to alert the medical community in time, to ensure that the reputation of plastic surgery is intact and, even more important, that patients are safer. There are many ways to establish this network, and it is up to the main aesthetic and plastic surgery organizations to begin the process. The work of ASERF is an excellent starting point.

Patient Safety in Gluteal Fat Augmentation

Anatomy

The key to performing gluteal augmentation safely and minimizing risk and complications is to truly know the anatomy of the gluteal area (Figure 3). The greater sciatic foramen is especially important. The foramen is formed by the sacrotuberous and sacrospinous ligaments and the greater sciatic notch of the hip bone. This structure provides an exit from the pelvis into the gluteal region for numerous crucial anatomic structures, such as the piriformis muscle and several nerves, such as the sciatic nerve, the posterior cutaneous nerve of the thigh, the superior and inferior gluteal nerves, the nerves to the obturator internus and quadratus femoris, and the pudendal nerve (Figure 3).[25,26]

It is essential to also keep in mind the vessels that run through this area. Both the superior and the inferior gluteal vessels and the internal pudendal vessel can be exposed to trauma and great damage if they are not handled with care and caution (Figure 3). It is crucial not to injure any structures while grafting fat. This could easily happen when the cannula is tilted posteriorly while using the infragluteal incision or when grafting deep to the muscle or under the muscle (Figures 4-6).[26]

Literature

Review of the latest international literature has shown that, even in 2017, gluteal augmentation had a higher mortality rate than any other aesthetic surgery.[10] The high international mortality rate seen could be a result of technique-related adverse effects after muscle and submuscular grafting, such as complications from blood vessel injection (eg, pulmonary embolism and bleeding); infection (eg, necrotizing fasciitis); anesthesia-related causes; and patient-related causes (eg, systemic failure and being a poor candidate). The death related to thromboembolism, shown by existing meta-analyses about gluteal augmentation with fat, varies: 5 emboli were reported in 4105 patients (0.12%),[18] 4 fat emboli and 1 death were reported in 2609 patients (0.2%),[19] and 26 fatal fat emboli were reported with fat grafting to the gluteal area, with a total 64 deaths related to liposuction.[17] One-hundred-three nonfatal and 32 fatal pulmonary embolisms were reported in 198,857 operations performed by 692 surgeons (0.02% mortality rate).[9] In 2017, Ramos-Gallaro et al illustrated an anatomic study of prevention of fat embolism in fat grafting for gluteal augmentation.[26]

Positioning

In 2018, Villanueva et al[23] recommended putting the patient in a prone position with hips flexed in a "jackknife" position. However, as they stated, while placing patients in this position, attention must be directed to also bending the knees to avoid lower extremity venous stasis, which increases the risk for deep venous thrombosis. Furthermore, in our view, the cannula inserted from infragluteal and supragluteal incisions in this position could be easily tilted downward to the greater sciatic foramen area. Therefore, we do not recommend use of an angled cannula in this region. We agree that, for lateral positioning, as Mendieta[6] reported previously, this technique can guide the procedure to a more superficial grafting plane.

No major complications occurred in patients at the Oslo Clinic because of the guidelines applied, such as use of a blunt cannula, staying superficial, avoiding insertion from the lower buttocks, and thinking about the location of the greater sciatic foramen, which could lower the risk for death.[12] Although a 3-mm cannula of 15 cm with good view for controlling the tip (we never grafted intramuscularly or submuscularly) was used, a 4-mm or larger grafting cannula is recommended and now used at the Oslo Plastic Surgery Clinic. Other precautions are careful patient selection, excluding patients at high risk for complications and those with high/unrealistic expectations. Rapid mobilization postoperatively is crucial to avoid thrombosis. In addition, the volume grafted during surgery is correlated with complications, and lesser volumes can reduce complications such as compartment syndrome and skin necrosis.

These reports bring up important points regarding gluteal fat augmentation, such as where fat is grafted subcutaneously, the location of the greater sciatic foramen and surrounding vascular structure, the size of the grafting cannula 4 mm or larger, safety factors during the procedure (including constant motion of the cannula, large size of cannula, and staying above the muscle), the grafted volume when achieving the desired shape and when achieving the desired volume, and stopping when fat is overrunning the injection sites. With all precautions in mind, it is possible to lower the mortality rate (Figures 4-6).

Patients should be aware of the danger related to this operation and should be encouraged to choose surgeons

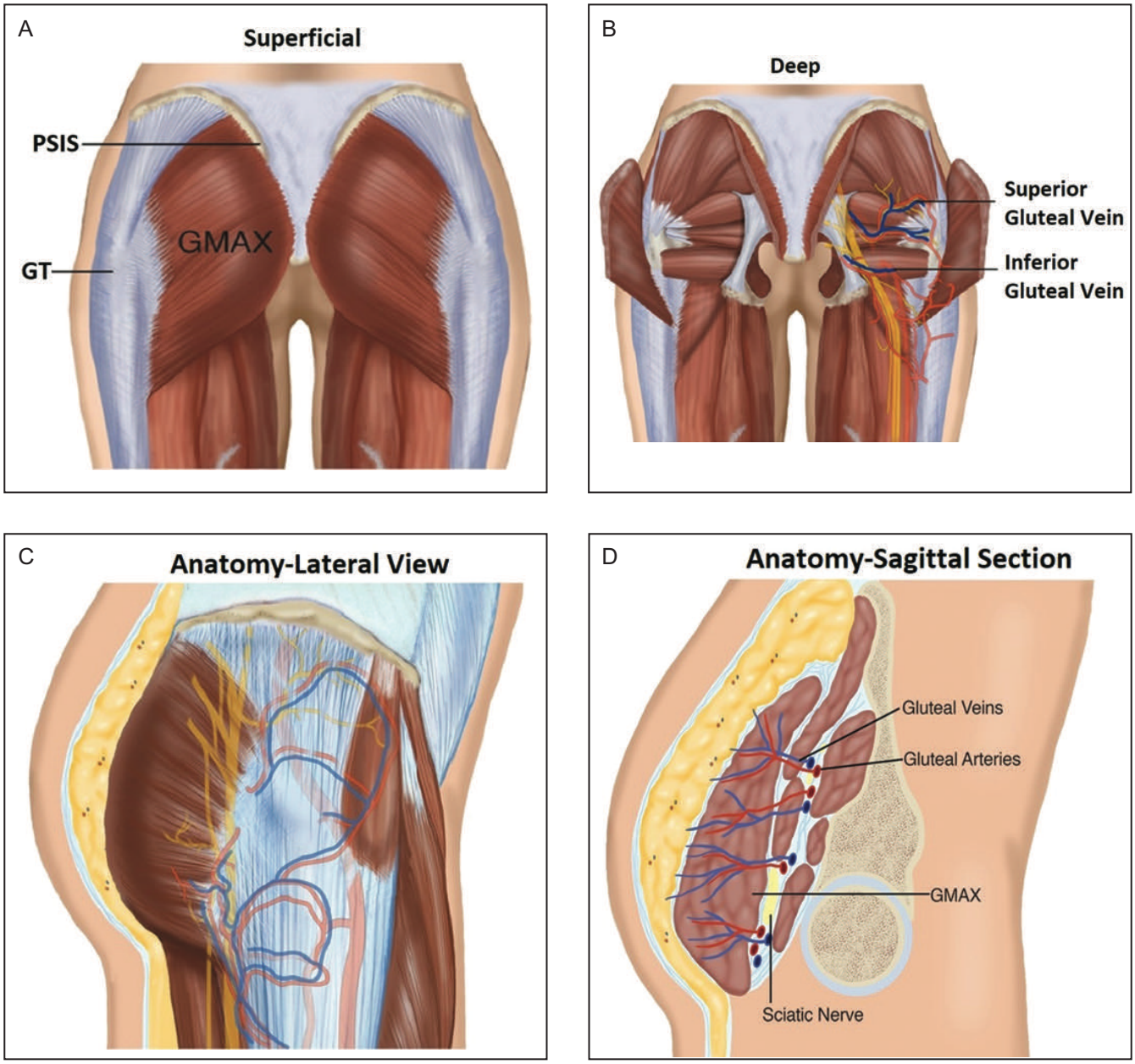

Figure 3. Posterior view of the gluteal area. (A) Superficial anatomic structures of the gluteal area. (B) Deep anatomic structures of the gluteal area with muscles elevated. (C) Lateral view of the gluteal area. (D) Sagittal view of the gluteal area showing subcutaneous fat, muscle, and blood vessels.

who are board certified in plastic surgery. The most important priority must be patient safety. One focus of our study was how to reduce mortality and morbidity rates in gluteal augmentation with fat.

Expectations and Risks

To promote realistic expectations, good patient selection should be made and information should be given. The higher the unrealistic expectations regarding volume, the higher the risk in performing the procedure. The way the media report on patients creates unrealistic expectation for patients, which should be addressed from the first consultation.

Certainly, important points of previous studies were cited herein, including the most recent from January 2018 in our literature review. The technique described herein is the authors' own experience, and useful points are illustrated that make patient safety a priority. One main advantage offered by fat grafting gluteal augmentation is the possibility of reshaping the region to obtain universal and ethnic-specific ideals regarding beautiful buttocks. This can be achieved by combining liposuction of

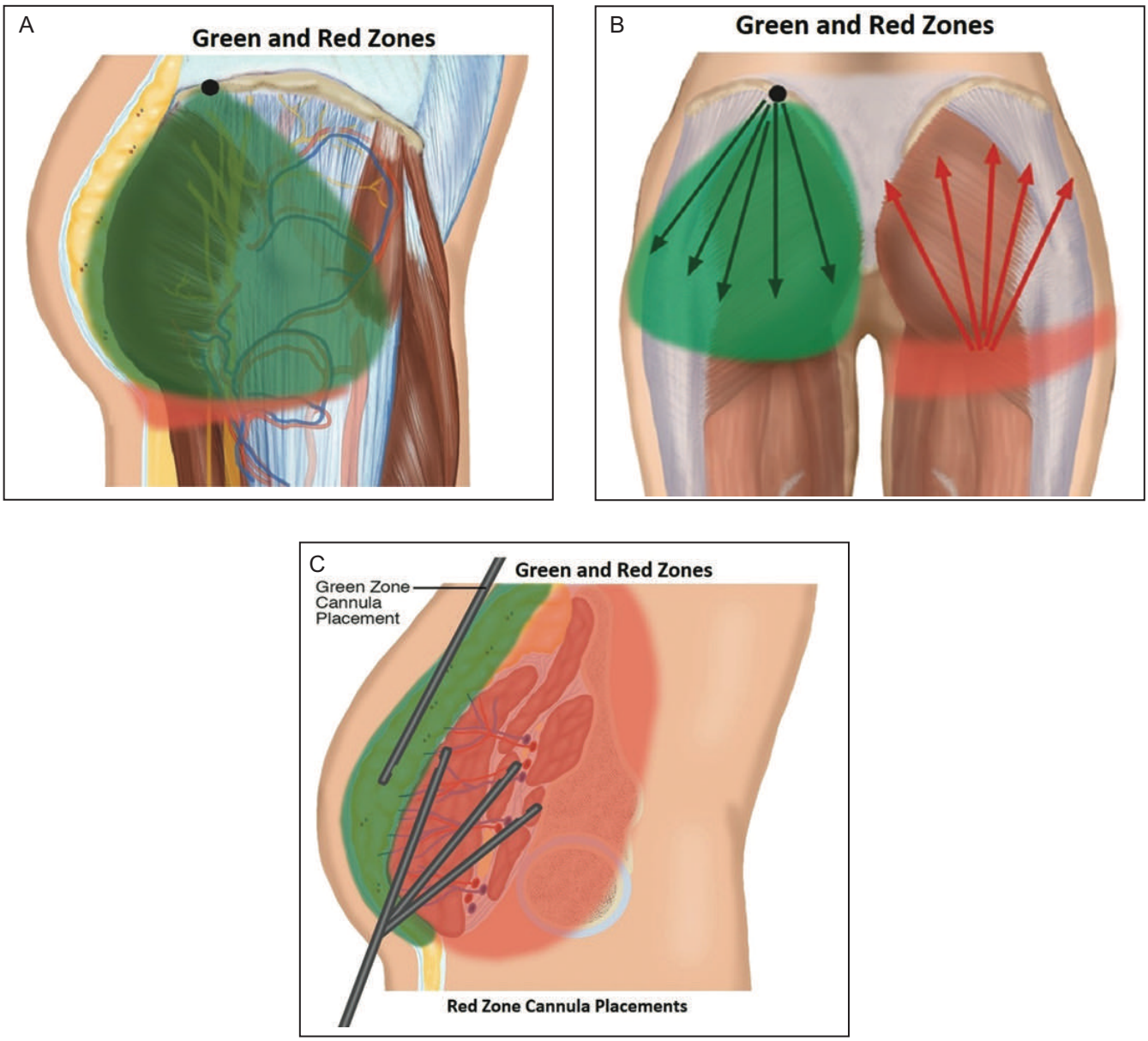

Figure 4. Zones during gluteal augmentation. (A) Green demonstrates safe zones for grafting during gluteal augmentation. (B) Green demonstrates recommended grafting incisions sites for gluteal augmentation. Red demonstrates grafting sites that should be avoided for the safety of the patient. (C) Sagittal view of the gluteal area. Green demonstrates safe zones for cannula placement during gluteal augmentation. The red zone should be avoided for the safety of the patient.

the upper and lower back and augmentation of the lateral two-thirds of the buttocks.[17,27,28] The procedure of gluteal augmentation has the advantage of combining liposuction and enlargement, refiguring the buttocks/back and front of the patients at the same time as the upper and lower back, abdomen, and the sides, in addition to gluteal augmentation, which is a win-win situation. This should be discussed with the patient because it is not about "fat hunting" as much as correction and reshaping the back and front.

Strengths of the Study

This is a retrospective consecutive study in which the procedures are performed by a single surgeon. To our knowledge, this is the first study from Scandinavia, and probably Europe, that focuses on safety. The preoperative assessment and our criteria for performing the procedure, the moderate amount of grafted volume, the grafting level being only subcutaneous, and the discussion of safety points, such as not grafting from the infragluteal

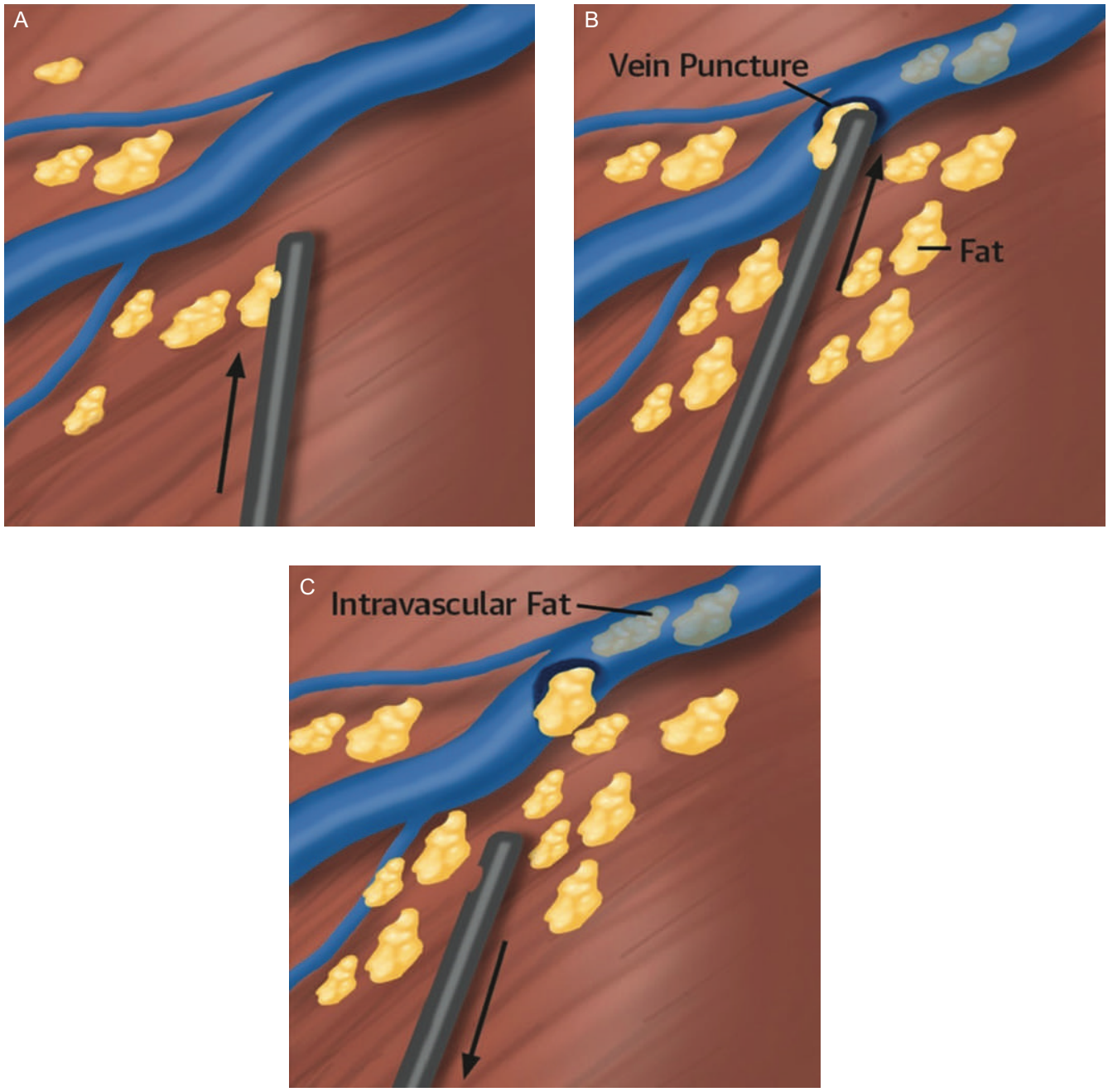

Figure 5. (A) Safe grafting does not damage the vein. (B) Demonstration of venous damage. (C) Demonstration of venous damage with intravascular fat, which results in fat emboli and should be avoided.

area and internate areas, are additional points to consider. Furthermore, the type of anesthesia used in our patients, which was only sedation and lipotumescent; the emphasis on direct mobilization of patients as they move with help from perioperative to postoperative status; the animation figures (Figures 3-6) that illustrate safety, created by the authors, are easy to understand and show how easy it is to teach the technique; and, finally, the attempt to combine a literature review of death with this procedure and a retrospective study are all factors that enhance our consideration of patients safety.

Limitations of the Study

Although we focus on the safety issues and the technique itself, as well as an international review, longer follow-up and larger number of patients could be an advantage to the study. Furthermore, use of a quality-of-life questionnaire

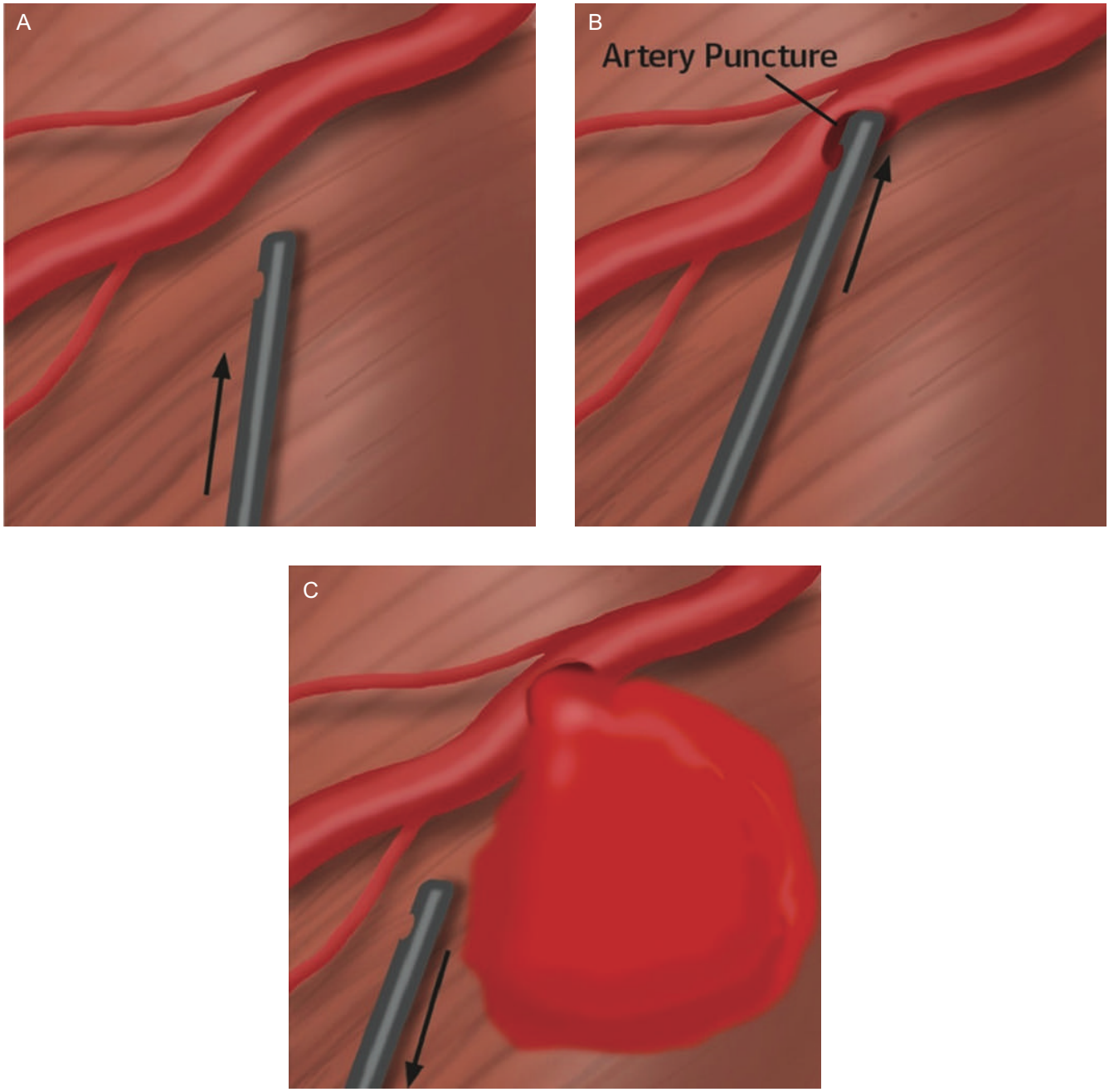

Figure 6. (A) Safe grafting does not damage the artery. (B) Demonstration of arterial damage. (C) Demonstration of bleeding after artery damage, which should be avoided.

could enhance the study. This was a retrospective study using the journal notes that the authors had for every patient. The follow-up was mainly clinical and by photographs. Patients at the Oslo Clinic are given a 1-year guarantee of a new procedure if not satisfied or if a complication occurs, which is why we believe our results are reliable. However, more accurate measurements using ultrasound and photographs could be beneficial.[29] Additional anonymous investigation regarding quality of life and satisfaction could be interesting to perform later on with the same patients to see whether our assumptions correspond to the quality of life of the patients.

CONCLUSIONS

Gluteal augmentation using fat has been one of the most popular procedures in the preceding 3 years at the Oslo Clinic, and the international mortality rate is high.

Thorough selection of patients, per operative position to create a safe path for grafting in the desired planes, the use of a blunt large cannula, a superficial approach above the muscle to avoid vessel damage and avoiding grafting from an infragluteal incision are some recommendations to optimize safety. Grafting of large volumes at one time is not advised, and immediately mobilizing the patient postoperatively is essential. The results of our analysis should help increase safety in this procedure.

Disclosures

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REFERENCES

1. Toledo LS. Augmentation of the buttocks by micro fat grafting. *Aesthetic Surg J*. 2001;21(4):311-319.
2. Toledo LS. The buttocks. In: Toledo LS, ed. *Refinements in Facial and Body Contouring*. Philadelphia: Lippincott-Raven; 1999:135-163.
3. Toledo LS. Gluteal augmentation with fat grafting: the Brazilian buttock technique: 30 years' experience. *Clin Plast Surg*. 2015;42(2):253-261.
4. Matsudo PK, Toledo LS. Experience of injected fat grafting. *Aesthetic Plast Surg*. 1988;12(1):35-38.
5. Ho Quoc C, Mojallal A, Delay E. Esthetic gluteal remodeling by fat grafting. *Ann Chir Plast Esthet*. 2013;58(3):194-200.
6. Mendieta CG. Gluteal reshaping. *Aesthet Surg J*. 2007;27(6):641-655.
7. Abboud MH, Dibo SA, Abboud NM. Power-assisted gluteal augmentation: a new technique for sculpting, harvesting, and transferring fat. *Aesthet Surg J*. 2015;35(8):987-994.
8. Ali A. Contouring of the gluteal region in women: enhancement and augmentation. *Ann Plast Surg*. 2011;67(3):209-214.
9. Mofid MM, Teitelbaum S, Suissa D, et al. Report on mortality from gluteal fat grafting: recommendations from the ASERF Task Force. *Aesthet Surg J*. 2017;37(7):796-806.
10. Mofid MM, Gonzalez R, de la Peña JA, Mendieta CG, Senderoff DM, Jorjani S. Buttock augmentation with silicone implants: a multicenter survey review of 2226 patients. *Plast Reconstr Surg*. 2013;131(4):897-901.
11. Wall S Jr, Del Vecchio D. Commentary on: Report on mortality from gluteal fat grafting: recommendations from the ASERF Task Force. *Aesthet Surg J*. 2017;37(7):807-810.
12. Whitfield RM, Rios LM Jr, DiBernardo BE. Making fat transfer to buttocks safer. *Aesthet Surg J*. 2017;37(10):1199-1200.
13. Cosmetic surgery national data bank statistics. *Aesthet Surg J*. 2017;37(suppl 2):1-29.
14. American Society of Anesthesiologists. Continuum of depth of sedation: definition of general anesthesia and levels of sedation/analgesia. Approved by the ASA House of Delegates on October 13, 1999, and last amended on October 15, 2014.
15. Klein JA, Jeske DR. Estimated maximal safe dosages of tumescent lidocaine. *Anesth Analg*. 2016;122(5):1350-1359.
16. Kaplan B, Moy RL. Comparison of room temperature and warmed local anesthetic solution for tumescent liposuction. A randomized double-blind study. *Dermatol Surg*. 1996;22(8):707-709.
17. Cárdenas-Camarena L, Bayter JE, Aguirre-Serrano H, Cuenca-Pardo J. Deaths caused by gluteal lipoinjection: what are we doing wrong? *Plast Reconstr Surg*. 2015;136(1):58-66.
18. Condé-Green A, Kotamarti V, Nini KT, et al. Fat grafting for gluteal augmentation: a systematic review of the literature and meta-analysis. *Plast Reconstr Surg*. 2016;138(3):437e-446e.
19. Oranges CM, Tremp M, di Summa PG, et al. Gluteal augmentation techniques: a comprehensive literature review. *Aesthet Surg J*. 2017;37(5):560-569.
20. Sinno S, Chang JB, Brownstone ND, Saadeh PB, Wall S Jr. Determining the safety and efficacy of gluteal augmentation: a systematic review of outcomes and complications. *Plast Reconstr Surg*. 2016;137(4):1151-1156.
21. Vongpaisarnsin K, Tansrisawad N, Hoonwijit U, Jongsakul T. Pseudomonas aeruginosa septicemia causes death following liposuction with allogenic fat transfer and gluteal augmentation. *Int J Legal Med*. 2015;129(4):815-818.
22. *Multi-society gluteal fat grafting task force issues safety advisory urging practitioners to reevaluate technique [letter]*. American Society of Plastic Surgeons (ASPS), American Society for Aesthetic Plastic Surgery (ASAPS), International Society of Plastic Surgery (ISPS), International Society of Plastic Regenerative Surgeons (ISPRES), International Federation for Adipose Therapeutics and Science (IFATS). January 2018. https://www.surgery.org/sites/default/files/Gluteal-Fat-Grafting-02-06-18_0.pdf. Accessed April 30, 2018.
23. Villanueva NL, Del Vecchio DA, Afrooz PN, Carboy JA, Rohrich RJ. Staying safe during gluteal fat transplantation. *Plast Reconstr Surg*. 2018;141(1):79-86.
24. Nahai F. Acceptable risk: who decides? *Aesthet Surg J*. 2017;37(7):852-853.
25. Snell RS. The lower limb. *Clinical Anatomy by Regions*. 9th ed. Philadelphia: Lippincott Williams & Wilkins; 2004:435-526.
26. Ramos-Gallardo G, Orozco-Rentería D, Medina-Zamora P, et al. Prevention of fat embolism in fat injection for gluteal augmentation, anatomic study in fresh cadavers. *J Invest Surg*. 2017;0(0):1-6.
27. Oranges CM, Gohritz A, Kalbermatten DF, Schaefer DJ. Ethnic gluteoplasty. *Plast Reconstr Surg*. 2016;138(4):783e-784e.
28. Cárdenas-Camarena L, Lacouture AM, Tobar-Losada A. Combined gluteoplasty: liposuction and lipoinjection. *Plast Reconstr Surg*. 1999;104(5):1524-1531; discussion 1532-1533.
29. Swanson E. Prospective controlled study of buttock fat transfer using ultrasound and photographic measurements. *Plast Reconstr Surg Glob Open*. 2016;4(5):e697.

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SoMe and Behavioral Science

Female Cosmetic Genital Surgery: Patient Characteristics, Motivation, and Satisfaction

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Abstract

Background: Female cosmetic genital surgery is rapidly growing. However, controversy reports raised around these procedures question their indications, motives, and safety. Warning against performing this surgery might unjustly restrict surgical alleviation of symptoms.

Objectives: Through anonymous research, the authors explored patient characteristics and motivation, when women started to think about surgery, and effects of surgery on psychosocial and cosmetic aspects.

Methods: Of 125 patients who underwent female cosmetic genital surgery at Oslo Plastic Surgery Clinic between 2010 and 2016, 69 patients were reachable by email. A questionnaire with 40 questions was completed anonymously. Answers were processed by a third, independent party via QuestBack return mail system.

Results: The response rate was 77%. Mean follow-up time was 31.4 months. Mean patient age was 30.8 years. Motivations for surgery were cosmetic (69.8%), physical/practical (62.3%), emotional (54.7%), and intimate (49.1%). When emotional reasons were involved, media (39.7%), pornography (31.5%), and negative comments (28.8%) influenced the decision to undergo surgery. Genital concerns had negative effects on self-esteem (63.2%) and sexual attractiveness (57.9%) among others; 90.5% thought about surgery for more than 1 year. The overall cosmetic result was satisfactory for 69.8%, and the operation as a whole was satisfactory for 75.5%.

Conclusions: Age, level of education, and gross income of patients who underwent this surgery seem high compared with those of breast implant patients. Genital dissatisfaction arose early in life and affected various psychosexual aspects. Most patients are satisfied with the outcome of surgery and would recommend this surgery to others. Additional anonymous multicenter studies are recommended.

Level of Evidence: 4

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More women are choosing to undergo genital surgery.[1-4] Female cosmetic genital surgery comprises a range of procedures that include labia minora plasty, labia majora plasty, clitoral hood plasty, mons pubis reduction, introitus plasty, and vaginoplasty. In 2017, a total of 10,787 labiaplasty procedures were performed in the United States alone.[1] The American Society for Aesthetic Plastic Surgery noted a percentage increase of 217.3% in the number of labiaplasties performed from 2012 to 2017, suggesting a dramatic increase in patient interest in undergoing these procedures.[1]

However, surgery on the external genitalia is controversial in many countries, including Norway, where the procedures

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frequently are referred to as "intimate surgery," owing to controversy that arose when organizations such as The American College of Obstetricians and Gynecologists and The Society of Obstetricians and Gynecologists of Canada warned about promoting female cosmetic genital surgery too freely.[5-8] Various medical authorities (some gynecologists and psychologists) and social authorities (some women's organizations) have raised concerns about the practice, marketing/advertising, and consequences of these procedures on women's health.[9-11] For example, it has been claimed that the available scientific evidence is not sufficient to warrant the rapid increase in the number of procedures performed.[12,13] Other authors took it further, arguing that female cosmetic genital surgery can be compared to female genital mutilation.[9]

In light of the increasing criticism toward female cosmetic genital procedures, the authors share the opinion of other researchers[14-16] that the necessity of female cosmetic genital surgery should be justified by conducting quality of life (QoL) research.

Therefore, the authors wanted to determine if women were affected by cosmetic and functional limitations and whether the surgery entailed psychosocial and cosmetic improvements. The aim of the present study was to anonymously study the combination of patient characteristics, depression rate, motivation, and effects of social media and pornography on the decision to undergo surgery; the time elapsed between starting to think about the problem and undergoing surgery; psychosocial and cosmetic results after female genital cosmetic surgery; and what complications have been experienced after surgery.

METHODS

Questionnaire and Demographics

A questionnaire was created by the authors and consisted of 40 questions that detailed patient characteristics and epidemiologic background, mental health and presence of depression, daily/work activities, motivation for undergoing surgery, and psychosocial and cosmetic changes. Various demographic factors, including participant age, number of childbirths before surgery, civil status, type of work, and gross income, were assessed. A copy of the questionnaire (Appendix A) is available online as Supplementary Material at www.aestheticsurgeryjournal.com.

The following inclusion criterion was applied: patients must be reachable by email for follow-up for at least 1 year.

As a mean to improve the quality of the questionnaire, it was pretested on a sample of 8 patients who had undergone different types of female cosmetic genital surgery procedures at the Oslo Plastic Surgery Clinic. Patients were first contacted by telephone and asked to validate the questions via email by giving feedback on the quality and understandability of questions as well as the questionnaire's length. The feedback was discussed among the authors, and, together with a professional language expert, the quality of the questionnaire was further improved. Adequate corrections for facilitated reading comprehension and patient convenience were incorporated to create the new version of the survey, which was then sent to the participants of the current study.

Measures to Ensure Anonymity

This study was conducted using a third, independent, party—QuestBack return mail system (QuestBack AS, Oslo, Norway)—which automatically processed survey answers anonymously and guaranteed fully anoymous handling of the results by sending the results as tables and diagrams to the authors. Steps were taken by QuestBack to ensure there was no possibility of interference with the results, meaning that the treating clinicians and authors were not involved in the process of data analysis and interpretation. This system not only guarantees full anonymity for the patient but also ensures unaffected results, thereby reducing bias. By registering the email addresses of all patients in the clinic records, the questionnaire could be sent by email.

The present study was exempt from approval by an institutional review board because it was conducted anonymously. Patients were informed about the study by telephone and gave consent to use their answers anonymously. The authors followed the guiding principles from the Declaration of Helsinki. Of the 125 consecutive patients who underwent female cosmetic genital surgery at the Oslo Plastic Surgery Clinic between September 2010 and December 2016, 69 were reachable via email (ie, the participants received the questionnaire) and 53 participated in the study.

Anesthesia and Type of Surgery

As with all other data, information about the type of surgery was obtained from the answers to the questionnaire by the participants. Conversely, knowledge about the type of anesthesia used was acquired from the medical records of the clinic.

Surgical Techniques

For labiaplasty, central wedge excision was used according to the technique by Alter.[3] Clitoral hood reduction was performed by upper lateral oval skin excision. To achieve a totally hidden scar, the scar ended completely in the groove between the medial border of the labia majora and the lateral border of the clitoris. Cranial skin excision was not used, because it would leave a visible scar at the top of the vulva in conjunction with the lower border of

the mons pubis. Labia majora reduction was performed by oval excision of the inner part of the labia majora of approximately 20% to 50% of the total width. The scar was totally hidden in the medial sulcus between the labia majora and labia minora.

Labia majora augmentation was performed by means of microfat grafting. After lipotumescent infiltration, the fat was generally harvested from the abdomen through a small-hole cannula and decanted for approximately 15 minutes. An 18 G needle was used for the incision site cranially, and an amount of about 10 to 25 mL of fat per side was grafted through multiple movements with a 1-mL syringe.

Motivation for Female Cosmetic Genital Surgery

Although the primary motivation for female cosmetic genital surgery was cosmetic, similar to the motivation for other procedures in aesthetic surgery, it was important to elucidate all the reasons patients chose surgery. Therefore, answer options regarding patient motivation were divided into 5 categories: "physical/practical reasons," "emotional reasons" (eg, reduced self-esteem, effects on mood and confidence), "cosmetic reasons" (not satisfied with the appearance of the genitals), "intimate reasons" (within interpersonal relationships), and "hygienic reasons." Furthermore, the specific motives of women who cited physical or practical reasons for receiving surgery were elaborated. These included whether it was uncomfortable for the women to wear tight jeans or whether the genital area was visible through tights and yoga pants or underwear and swimwear. Emotional reasons were expanded by asking whether women were affected by the media, pornography, and negative comments and to what extent patients were influenced by these factors ("a lot," "moderate," "a bit," or "none").

The authors also investigated possible effects of the genital area on the woman's life regarding self-image and sexual function. Participants were asked whether the appearance of the genitals made them feel self-conscious, whether it had a negative impact on their self-esteem, and if women felt less sexually attractive to their partner or had any limitations. Moreover, patients were asked whether they experienced physical/functional implications of the genitalia, such as flipping of the labia into the vagina or pain during intercourse.

Participants were also asked at which point in life ("during puberty," "after giving birth," "at an older age," or "always had this problem") the problems with the genital area arose and for how long they had been thinking about the genital area before consulting the clinic. Finally, asymmetry in different parts of the genital area before surgery was assessed by asking about potential differences in "size," "shape," and "hanging."

Satisfaction With Female Cosmetic Genital Surgery

Cosmetic Outcome

Patient satisfaction with the appearance of the genital area after the procedure was compared with their preoperative level of satisfaction and was measured using a 5-point scale: 1 (much worse), 2 (worse), 3 (as expected/no change), 4 (better), and 5 (much better). For a more convenient statistical analysis, the items were merged into 3 scales: lesser degree (1 and 2 were merged), no change (3), and greater degree (4 and 5 were merged). Questions encompassed size, shape, skin sensation, and symmetry of the genital area, as well as scars and appearance of the labia and the surrounding area after surgery. In addition, satisfaction with the aesthetic result in total and the experience with the operation in total were assessed. Finally, participants were asked whether they had experienced any postoperative complications and whether they would recommend the procedure to someone else.

Psychosocial Outcome

Using the exact same scale, the postoperative psychological well-being of patients was evaluated. Questions included whether life changed for the women after surgery and if they felt more like a "whole" person. Patients were also asked about potential changes in the ability to "interact" with others and whether shyness in intimate situations improved after surgery.

RESULTS

Patients

The response rate to the questionnaire was 77% (53/69). The average follow-up time (standard deviation) was 31.4 (16.20) months (range, 7-68 months). Between September 2010 and December 2016, a total of 125 women underwent female cosmetic genital surgery at the clinic of the senior author (A.K.). The mean age of the patients at the time of surgery was 30.8 (10.3) years (range, 17-60 years). Slightly more than two-thirds of the total number of participants belonged to the age groups 21 to 25 years, 26 to 29 years, and 45 years or older. More than half the patients (58.5%) were nulliparous, whereas 39.6% had experienced 1 or more childbirths. More specifically, 13.2% delivered 1 child, 17% delivered 2 children, and 9.4% had given birth to 3 or more children. By the time of the operation, 52.8% of patients were in a relationship and 47.2% were not. Just over 60% of the women had finished university

Table 1. Patient Characteristics: Age, Relationship Status, Education, and Annual Gross Income (n = 53)

Age (y)	n (%)	Current relationship	n (%)	Education	n (%)	Annual gross income ($)	n (%)
<25	20 (37.7)	Yes	28 (52.8)	Primary school	1 (1.9)	<25,000	8 (15.4)
26-34	17 (32.0)	No	25 (47.2)	High school	18 (34.0)	25,000-50,000	9 (17.3)
35-44	4 (7.6)			College	12 (22.6)	50,001-75,000	17 (30.8)
>45	12 (22.6)			University	20 (37.7)	>75,000	10 (19.2)
				Do not wish to answer	2 (3.8)	Do not wish to answer	9 (17.3)

or college and 34% had completed high school. Only 1 patient (1.9%) finished primary school only. Evaluation of patient work and career showed a rather even distribution: of the given options (physical/manual work, administrative work, combined physical and administrative work, housewife, other, or no answer), 30.8% of patients reported working in a combination of physical and administrative work, 28.8% did administrative work, and 21.2% did physical work. Exactly half the patients had an annual gross income higher than 50,000 USD, and 19.2% earned more than 75,000 USD. Slightly more than 15% earned up to 25,000 USD, and 17.3% had an income between 25,000 USD and 50,000 USD. These numbers represent the annual salary of the women only and not necessarily the total household income. Patient demographic information is shown in Table 1.

Anesthesia and Type of Surgery

In 116 patients (92.8%), procedures were performed under general anesthesia, whereas 9 patients (7.2%) received local anesthesia with sedation only. Most patients underwent labia minora reduction (71.7%), followed by clitoris lift (18.9%), and labia majora reduction (17%). Relatively few women (9.4%) sought reduction of the mons pubis (Figures 1 and 2).

Motivation

The motivation to undergo surgery was for "cosmetic reasons" in approximately 70% (69.8%) of women. However, "physical or practical reasons" and "emotional reasons" were also frequently stated (62.3% and 54.7%, respectively). For almost half the patients (49.1%), "intimate reasons" constituted motivation for surgery and 17% included "hygienic reasons" (Table 2). For "physical or practical reasons," 78.1% of women reported discomfort wearing tight jeans, 56.3% stated that the genital area was visible through swimwear or underwear, and 46.9% stated that the genital area was visible through tights or yoga pants. Moreover, 39.5% of the total number of patients reported flipping of the labia into the vagina, and 21.1% experienced pain during intercourse.

Influence of the Media, Pornography, and Negative Comments

Roughly 40% of patients who were motivated by emotional reasons were affected by the media, whereas pornographic content and negative comments were the influence in 31.5% and 28.8%, respectively. In total, almost half the patients reported a moderate (20.7%) or strong (27.6%) influence by the media in the decision to undergo surgery. Pornography had a moderate (17.2%) or strong (17.2%) impact on just over one-third of participants and influenced 6.9% of women "a bit." Negative comments had a moderate (13.8%) or strong (10.3%) influence on women's decision to undergo surgery in roughly one-quarter of patients and exerted only minor influence in 17.2%.

Preoperative Asymmetry and Problem-Awareness Acknowledgment Period

When women were asked about asymmetry in different parts of the genital area before surgery, 50.9% of the women noted a difference in size, 45.3% in hanging and 17% in shape. Only 9.4% of patients thought the genital area was symmetrical. The data for women affected by psychosocial and functional problems and preoperative asymmetry of different parts of the genital area are shown in Table 3.

When patients were asked how long they had been thinking about the genital area before consulting the clinic, more than half of the women reported a period of more than 6 years, 13.2% thought about it for 1 to 3 years, and 22.6% considered it for 3 to 6 years, whereas only 1 patient (1.9%) thought about it for less than 1 year. In accordance, 57.9% of patients noticed problems with the genital area during puberty, and 42.1% stated that the problem had always been present (Table 4).

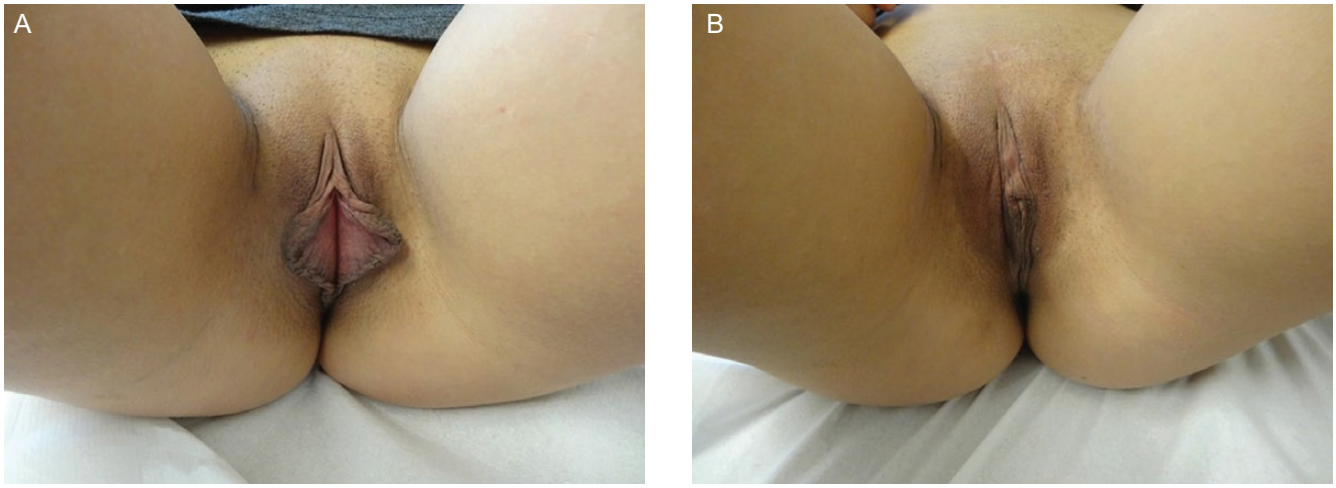

Figure 1. (A) Preoperative photograph of this 23-year-old woman presenting with large labia minora. (B) Postoperative photograph taken 12 months after labia minora reduction using the central wedge technique.

Psychosocial Outcomes

Before surgery, 63.2% of patients reported a negative effect on self-esteem because of dissatisfaction with the appearance of the genitals, 57.9% felt less sexually attractive to their partner, 42.1% had limitations, and 36.8% felt very self-conscious about the appearance of the vaginal area. Of note, 9.4% of women experienced depression and/or took antidepressant medication at the time of surgery; however, according to these women, depression did not affect the decision to undergo surgery.

Most women (60.3%) reported a change to a great or very great degree in their lives after undergoing surgery, whereas 13.2% noticed a moderate change, and 26.4% were affected only to a small or very small degree. When patients were asked whether they felt more like a "whole" person after the procedure, a slight majority of women (54.7%) agreed, whereas 26.4% noted a moderate change, and 18.8% reported that surgery affected this outcome measure only to a small or very small degree. Shyness in intimate situations improved for 58.5% of the women, moderate change was noticeable for 20.8%, and minor change was reported by 20.7% of participants. In contrast, only 20.8% of women reported noticeable improvement in the ability to interact sexually with others via social networking, whereas 37.7% noticed change to a moderate degree and 41.5% to a small or very small degree.

Cosmetic Results

Overall satisfaction with the surgery outcome was relatively high; almost 70% of women reported satisfaction with the total aesthetic result and more than three-quarters of patients reported satisfaction with the operation in total. Postoperatiely, 60.4% of women were satisfied with the size of the vaginal area, and postoperative shape met the demands in 54.7% of patients. Another important parameter for patient satisfaction was skin sensation, which was met in just over three-quarters of patients (75.5%). In addition, the extent of scarring after surgery was satisfactory for most women (71.7%). Satisfaction with symmetry of the intimate area was reported in 58.5% of participants, and the labia and the surrounding area after surgery were satisfactory for 60.4%. Satisfaction ratings of cosmetic and psychosocial female cosmetic genital surgery outcomes are depicted in Table 5.

Complications

Twelve patients (22.6%) reported experiencing one or more minor complications after they underwent surgery. Swelling was reported to be the most common (12 patients), followed by wound separation (dehiscence) and secretion, which occurred in 11 patients and 9 patients, respectively. Contrarily, the number of patients who were affected by pain, local infections necessitating the use of antibiotics, and a raised or sunken scar presented as low, with 2 affected patients for each. Other complications were hematoma (local, no surgery needed for evacuation) (6 patients), asymmetry or excess skin (6 patients), local infections in total (4 patients), and fungal infection (3 patients).

Expectations and Recommendation

Surgical outcomes met preoperative expectations to a great degree in 54.7% of patients, whereas expectations were exceeded for 15.1% of patients. In contrast, 11.3% of patients stated that the results were below expectations, and expectations could not be met at all in 9.4% of patients.

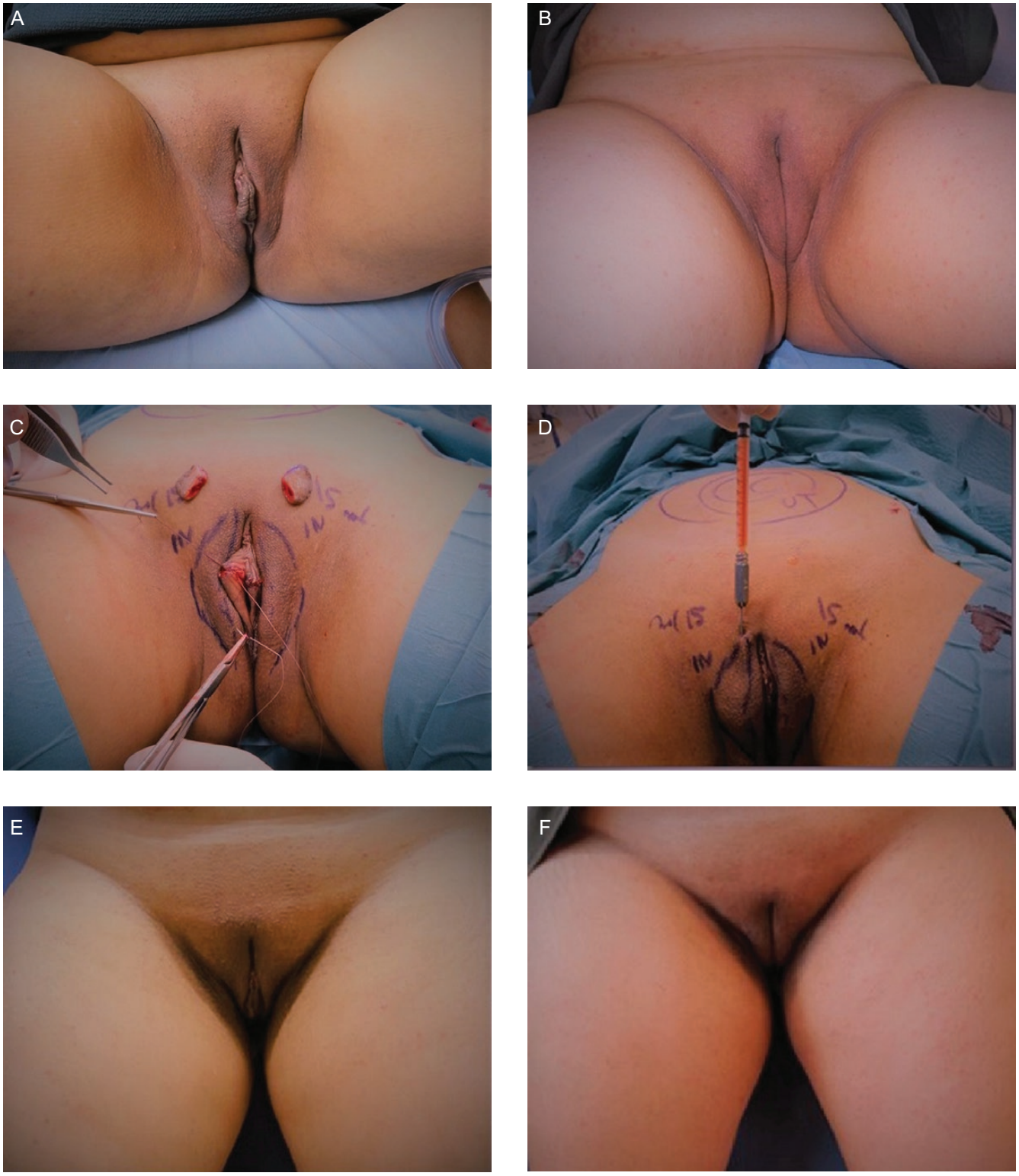

Figure 2. (A) Preoperative photograph of this 34-year-old woman who presented with hypertrophic labia minora and hypotrophy of labia majora. (B) Postoperative photograph taken 12 months after labia minora reduction and concomitant labia majora augmentation with fat grafting. (C) Perioperative photograph after central wedge reduction and multilayer suturing. Note the resected edge over the mons pubis. (D) Perioperative photograph of labia majora augmentation: a cannula with a 1-mL syringe was used to graft microfat. (E) Preoperative photograph with the patient in a standing position. The labia minora are clearly shown. (F) Photograph with the patient in standing position taken 12 months postoperatively.

Table 2. Motivation for Intimate Surgery and How Physical and Emotional Reasons Affect Patients (n = 53)[a]

Motivation	n (%)
Physical/practical reasons[a]	33 (62.3)
How much did the following affect you?	
The intimate area made it uncomfortable to wear tight jeans	26 (78.1)
The intimate area was visible through tights or yoga pants	15 (46.9)
The intimate area was visible through underwear/swimwear	19 (56.3)
Other	3 (9.4)
Do not wish to answer	2 (6.3)
Emotional reasons	29 (54.7)
How much did the following affect you?	
The media	12 (39.7)
Pornographic influence	9 (31.5)
Negative comments	8 (28.8)
Cosmetic reasons	37 (69.8)
Intimate reasons	26 (49.1)
Hygiene reasons	9 (17.0)

[a]Some patients gave more than 1 reason.

Most women (86.8%) would choose to receive the same surgery again, whereas 7.5% were not sure and only 5.7% would not repeat the procedure. Furthermore, based on their own experience, more than two-thirds of women (67.9%) would recommend cosmetic genital surgery to others, whereas just over one-quarter of women (26.4%) were not sure and only 5.7% would not recommend this type of surgery to others.

DISCUSSION

Consistent with previous research,[17-21] the mean age of women seeking female cosmetic genital surgery was high. Compared with a very established surgical procedure in aesthetic surgery (breast augmentation with implants), a considerably higher number of women who request cosmetic genital surgery (22.6%) are older than 45 years as opposed to only 6.1% of women who underwent breast augmentation with implants at the same clinic.[22,23] Furthermore, the level of education in women undergoing cosmetic genital surgery shows a drastic difference compared with breast implant patients: only about 36% of patients in the breast implant group completed university/college in contrast with slightly more than 60% of women from the current study. This difference is also reflected in the women's annual income: only 17.6% of patients undergoing breast implantation had an income higher than 50,000 USD compared with 50% of the female cosmetic genital surgery patients.[22,23] Slightly more than half the patients were in a relationship at the time of surgery, which concurred with previous findings by Sharp et al,[20] who showed that 60% of women who sought labiaplasty were in a romantic relationship. However, when Sharp et al compared the labiaplasty patients with a control group of women who did not want surgery, women contemplating labiaplasty were significantly less often in a romantic relationship.[20] Pertinently, an additional study[24] revealed that a satisfying romantic relationship potentially lowers the interest in receiving labiaplasty.

Regarding the presence of depression in female cosmetic genital surgery patients, a recent study by Bucknor et al[21] revealed that depression and anxiety were present in 14.6% and 5.8% of labiaplasty patients, respectively. In the current study, the authors also found that some women were diagnosed with depression or were taking antidepressant medication at the time of surgery; however, this occurred in only 9.4% of patients. Given that the depression rate in the general population of Norway ranges from 7% to 17%,[25-29] this percentage of 9.4% does not seem significant. A study by Veale et al[30] that reported that women contemplating labiaplasty were not more likely to have experienced anxiety and depression than women in the control group reinforces this presumption. An explanation for the relatively low rate of depression among study participants might be that patients were equally distributed among urban and rural areas stemming from a well-balanced set of social, educational, and health backgrounds. Nevertheless, it cannot be said with certainty whether the sample adequately represents the entire population. Furthermore, none of the women in the present study affected by depression associated their depression with the decision to receive surgery.

Cosmetic reasons regarding the appearance of the genitals were the primary motive in the women's decision to receive cosmetic genital surgery, closely followed by physical/practical concerns and emotional reasons. This is well in line with a robust body of literature.[20,21,30-33] In contrast, a study by Sharp et al[34] revealed physical concerns as the primary reason for surgery; cosmetic concerns were stated as secondary. However, the design of the study by Sharp et al[34] was based on one-on-one interviews, and a previous study successfully demonstrated that women may emphasize physical concerns over appearance concerns to legitimize their request for surgery.[35] Because the design of the current study was entirely anonymous, women did not feel coerced into choosing another option for the sake of social acceptance, which is why the gathered data may reflect the truth.

Nevertheless, physical/practical reasons have frequently been reported by participants. Function and practicability of women's genitalia might be hampered by

Table 3. Causes of Dissatisfaction and Degree of Asymmetry Before the Operation (n = 53)

Psychosocial implications[a]	n (%)	Functional implications	n (%)	Degree of asymmetry[a]	n (%)
You were very self-conscious due to appearance	20 (36.8)	The labia flipped into the vagina during intercourse	21 (39.5)	Totally symmetrical	5 (9.4)
It had a negative effect on your self-esteem	33 (63.2)	The labia caused pain during intercourse	11 (21.1)	Difference in size	27 (50.9)
You felt less sexually attractive to your partner	31 (57.9)			Difference in shape	9 (17.0)
You had limitations	22 (42.1)			Difference in hanging	24 (45.3)
				Other	7 (13.3)

[a]Some patients gave more than 1 answer.

Table 4. Time When Problems and Concerns With the Genital Area Were First Recognized and Timespan Contemplating Surgery (n = 53)

Time when problems were first recognized / surgery considered[a]	n (%)	Time span contemplating surgery	n (%)
During puberty	31 (57.9)	Less than 1 year	1 (1.9)
At older age	8 (15.8)	1-3 years	7 (13.2)
After giving birth	8 (15.8)	3-6 years	12 (22.6)
Always had this problem	22 (42.1)	More than 6 years	29 (54.7)
		Other	3 (5.7)
		Do not wish to answer	1 (1.9)

[a]Some patients gave more than 1 answer.

labial hypertrophy. In keeping with earlier findings,[15,36] before surgery many women reported discomfort wearing tight jeans and the visibility of the genitals through tight-fitting clothes. Women whose genitalia can be seen through clothing might feel anxious about showing themselves lightly clad in public spaces, thereby losing QoL. This supposition is consistent with the results of a prospective study by Crouch et al,[31] who showed that the presenting complaints of women, along with discomfort or pain during intercourse, were difficulties with sports and problems with underwear or clothing. Pain or flipping of the labia during intercourse were also frequently present among women requesting cosmetic genital surgery at our clinic, substantiating previous study results.[15,30,31,36]

In accordance with a study by Zwier[37] that considered motivations expressed by women within online communities, emotional discomfort regarding genital appearance and interpersonal relationships was found to be an important factor in women's decision to receive cosmetic genital surgery.

Preoperatively, many of the patients experienced a negative effect on self-esteem and self-confidence because of dissatisfaction with genital appearance, together with feelings of being less sexually attractive to their partner. Similarly, women in a study by Bramwell et al[35] reported anxiety about the partner coming into contact with their genitals, feeling self-conscious in sexual relationships, and hesitancy when starting new relationships. Veale et al[30] demonstrated that women requesting labiaplasty showed significantly higher levels of dissatisfaction toward their genital appearance than women not desiring surgery. Additionally, labiaplasty patients cited poorer QoL regarding body image and sexual satisfaction.[30]

In concert with previous findings,[20,24,34,38,39] a strong influence of the media and pornography on women's decision to access cosmetic genital surgery is noticeable in the current study. Fittingly, women contemplating any form of female cosmetic genital surgery have been shown to be likely to use the internet as the predominant information source.[34,40] This underscores the strong influence that mass media exposure exerts on aesthetic ideals today.[11,20] Exposure to images of "perfect vaginas" on the internet and to individuals in pornography might have an impact on women's perception of what is beautiful and set a new "ideal" of genital appearance.[11,13] Contrarily, a study by Sharp et al[34] revealed that very few women associated exposure to pornographic content with the desire to undergo labial reduction. However, because this study used one-on-one interviews and because pornography is stigmatized in society, women might not have been entirely honest about motives to undergo female cosmetic genital surgery.[34] Furthermore, negative comments were found to contribute to a woman's decision to surgically alter the genitalia. This is consistent with previous findings in female cosmetic genital surgery research.[34,38,41] For example, Veale et al[41] reported that roughly one-third of labiaplasty patients could recall negative comments concerning the labia. Correspondingly, Sharp et al[34] showed that most women could remember at least 1 negative experience—mainly negative comments from sexual partners—which translated into dissatisfaction with the labial appearance.

Women had been thinking about the genital area over a period of many years before making the decision to

Table 5. Changes in Psychsocial Aspects and Satisfaction in Cosmetic Outcomes With Female Cosmetic Genital Surgery (n = 53)

Variable	Lesser degree n (%)	No change, n (%)	Greater degree, n (%)
Psychosocial aspects			
To what degree do you feel...			
Life has changed after surgery	14 (26.4)	7 (13.2)	32 (60.3)
Like a "whole" person	10 (18.8)	14 (26.4)	29 (54.7)
The ability to interact with others (social networking) improved after surgery	22 (41.5)	20 (37.7)	11 (20.8)
Shyness in intimate situations improved after surgery	11 (20.7)	11 (20.8)	31 (58.5)
Variable	Dissatisfied n (%)	No change n (%)	Satisfied n (%)
Cosmetic aspects			
To what degree are you satisfied with...			
Size of genital area after surgery	8 (15.1)	13 (24.5)	32 (60.4)
Shape of genital area after surgery	11 (20.8)	13 (24.5)	29 (54.7)
Skin sensation of genital area after surgery	1 (1.9)	12 (22.6)	40 (75.5)
Scar(s) after surgery	7 (13.2)	8 (15.1)	38 (71.7)
Symmetry in the genital area	13 (24.5)	9 (17.0)	31 (58.5)
Labia and the surrounding area after surgery	9 (17.0)	12 (22.6)	32 (60.4)
The aesthetic result in total	9 (17.0)	7 (13.2)	37 (69.8)
The operation in total	5 (9.4)	8 (15.1)	40 (75.5)

consult the clinic; hence, the decision does not appear to be hasty. This is congruent with the finding by Veale et al[30] that the mean duration of concern in women seeking labiaplasty is 10 years. It might be concluded that the onset of the problem potentially correlates with specific negative memories such as teasing.[30] This is substantiated by the finding that a moderate to strong influence of negative comments on the decision to undergo female cosmetic genital surgery was present in nearly one-quarter of the patients in the current study. Similar to what is shown in previous research,[31] most patients reported recognizing the dissatisfaction about the intimate area early in life. More specifically, well over half the women recalled having first noticed the "problem" during puberty, whereas slightly more than 40% always had been affected. Fittingly, Bucknor et al[21] reported that asymmetry of the labia (ie, one side of the labia minora develops normally while the other does not exceed the prepubescent size) frequently arises during puberty. However, because more than 90% of the patients in the current study reported having some kind of genital asymmetry before the surgery and because it has been shown that labia minora width may range from 7 to 50 mm, it is essential to inform patients about the broad physiologic variety of genitalia.[13]

In terms of the psychosocial outcome, the majority of women noticed a change in their lives after undergoing a cosmetic genital surgery procedure, felt more like a "whole" person, and reported that shyness in intimate situations was reduced. It can be concluded that physical changes in women's bodies lead to improved self-image and enable women to experience more satisfying sex lives and greater self-confidence in general.[34,42,43] However, results were less favorable regarding the ability to interact with others via social networking. This discrepancy might be explained by the fact that other factors potentially have a greater impact on the respective value than changes in the appearance of the genitalia.

As in previous studies,[14,17,34,36,44-47] most of the patients expressed high levels of satisfaction with the cosmetic result regarding the appearance of the genitalia after they underwent female cosmetic genital surgery. To further elaborate on patient satisfaction, the postoperative level of satisfaction was assessed by means of different outcome measures (size, shape, skin sensation, scarring of the intimate area and symmetry, appearance of the labia and the surrounding area, the aesthetic result in total, and the operation in total). Satisfaction was found to be particularly high in skin sensation of the intimate area and scarring after surgery. The outcome of genital symmetry seemed to be slightly less favorable because only approximately 60% of women were entirely satisfied. However, because only around 10% of patients found their genitals to be totally symmetrical to start with, this appears to be a clear improvement. Furthermore, the size and shape of the intimate area after surgery were not satisfactory for approximately 40% of patients. This is consistent with findings by Sharp et al,[34] which showed that, although most women who underwent labiaplasty were generally highly satisfied with the surgical outcome, more than half the women noted that the expectations regarding the genital appearance, especially size and symmetry, were not fully met. A possible explanation for this might be that these women had probably expected a more significant reduction of the labia minora or majora.[34] When this was not accomplished due to the conservative excision technique used, the women potentially were less satisfied.[46] This underscores the need for clinicians to discuss the potential postoperative genital appearance with the patient, thereby preventing unrealistic patient expectations. Regarding satisfaction with the aesthetic result and the experience of the operation in total, approximately 9% to 17% of the

patients were in the unsatisfied range for these domains. This percentage is in agreement with that of a recent study by Sharp et al[46] that showed that 10% to 17% of patients were "slightly," "moderately," or "extremely" dissatisfied with postoperative labial appearance, functional outcome, and total goals achieved, respectively.

Strengths

A common limitation of several studies in female cosmetic genital surgery research is the relatively short follow-up time.[14] In the present study, the mean follow-up was 31.4 months, enabling the authors to detect potential changes in satisfaction with the aesthetic outcome and influence on the QoL of patients, which might not be evident within a short follow-up time. Additionally, the response rate to the questionnaire seems high compared with that of previous research.[3,22,23]

The present study represents research on female cosmetic genital surgery employing an anonymous study design, thereby eliminating bias and lending reliability to the interpretation of data because answers seem to be completely honest. In a recent study by Sharp et al[46] conducted independently of medical practitioners, it is not entirely clear whether the authors used a precautionary measure to receive and analyze the data anonymously.

Another strength of the study lies in the fact that all patients were operated on consecutively by the same surgeon (A.K.), allowing for good comparability between results. Furthermore, the study was conducted to evaluate certain, very detailed outcome measures of patient satisfaction such as postoperative size, shape, skin sensation, and scarring. Finally, this study illustrates the time elapsed before the decision to undergo surgery and when the awareness of the problems started.

Limitations

As with all studies, the results of this study should not be interpreted without knowledge of its limitations. One limitation was that no established validated outcome measures or scales, which might facilitate comparability between studies, were utilized for the assessment of patient satisfaction. Similarly, data on the psychological health of patients were only obtained from postoperative patient reports without employing established, formally validated psychometric measures. Moreover, the sample size for the revision of the questionnaire design was small, although the authors believe it was adequate to collect satisfactory answers to confirm the ease of completion and comprehensibility of the questionnaire. However, a larger sample of patients recruited to pretest the questionnaire might have been beneficial for additional feedback on the quality and understandability of the questionnaire.

Furthermore, given the anonymous design of the study, no additional questions about the reasons behind participant answer choices could be proposed. For example, it would be of interest to discover which group of patients (demographic characteristics, type of surgery, main motivation, etc.) shows greater and lower satisfaction with the outcome, respectively.

Finally, a shortcoming inherent in the retrospective design of the study was that patients had to recall certain feelings and experiences regarding the genitalia from the time before undergoing surgery. This might have lowered the level of accuracy when they answered the questions. To bypass this obstacle, additional studies with a prospective design, preferably with a matched control group, should be conducted in the future.

Safety and Complications

Only minor complications occurred after surgery. This is in accordance with findings from previous studies.[3,14,21,44,45,47] The most common complications were swelling, wound dehiscence, and secretion, which seemed relatively common. However, because the results were based solely on patient reports rather than on a professional view of a clinician and because, in our experience, there might be a propensity of patients to describe minor problems such as swelling more extensively, the authors believe that the occurrence of complications might be slightly higher than in studies based on clinician-reported outcomes.

CONCLUSIONS

The authors have provided the reader with further insight into patient characteristics, motivation, and effects of female cosmetic genital surgery on patient QoL. The average age seemed high, being close to 30 years. Slightly more than half the patients were in a relationship and nulliparous at the time of surgery. Higher levels of education and higher incomes were recorded compared with education level and income of breast implant patients from the same clinic. The true motivation for surgery was for cosmetic, physical or practical, emotional, and intimate reasons—women were not looking for a "designer vagina." Visibility of the intimate area and discomfort in tight clothing affected many patients. The influence of the media, pornography, and negative comments on a woman's decision to undergo surgery were common emotional reasons among patients. The study also demonstrated that women became aware of the problems with their genital area early in life and that women go through a long thought process before presenting to the clinic rather than make a hasty and impulsive decision. Preoperative asymmetry of different parts of the genital area was frequently reported and was

most commonly found in size and hanging. Dissatisfaction with genital appearance was found to have a detrimental influence on women's self-esteem, their subjective sexual attractiveness, and sexual intercourse. Depression rates and the use of antidepressant medication were not higher in female cosmetic genital surgery patients than in the general population. Labia minora reduction was the most frequently performed procedure. Complications after female cosmetic genital surgery were few and minor, indicating that these procedures are safe. These findings clearly underpin the positive influence of female cosmetic genital surgery procedures mainly on cosmetic aspects, which lead to a high recommendation rate. However, more studies with a prospective design, preferably with a matched control group and multicenter studies, should be conducted in the future.

Supplementary Material

This article contains supplementary material located online at www.aestheticsurgeryjournal.com.

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REFERENCES

1. Cosmetic Surgery National Data Bank Statistics. *Aesthet Surg J.* 2017;(suppl 2):1-29.
2. Alter GJ. A new technique for aesthetic labia minora reduction. *Ann Plast Surg.* 1998;40(3):287-290.
3. Alter GJ. Aesthetic labia minora and clitoral hood reduction using extended central wedge resection. *Plast Reconstr Surg.* 2008;122(6):1780-1789.
4. Hamori CA. Aesthetic surgery of the female genitalia: labiaplasty and beyond. *Plast Reconstr Surg.* 2014;134(4):661-673.
5. Committee on Gynecologic Practice, American College of Obstetricians and Gynecologists. ACOG Committee Opinion No. 378: Vaginal "rejuvenation" and cosmetic vaginal procedures. *Obstet Gynecol.* 2007;110:737-738.
6. Society of Obstetricians and Gynaecologists of Canada. Policy Statement. Female genital cosmetic surgery. *J Obstet Gynaecol Can.* 2013;35:e1-e5.
7. Royal College of Obstetricians and Gynaecologist. *Ethical Considerations in Relation to Female Genital Cosmetic Surgery (FGCS)*. RCOG Ethics Committee; 2013. https://www.rcog.org.uk/globalassets/documents/guidelines/ethics-issues-and-resources/rcog-fgcs-ethical-opinion-paper.pdf. Accessed July 14, 2018.
8. The Royal Australian and New Zealand College of Obstetricians and Gynaecologists. RANZCOG College Statement: C-Gyn 24. Vaginal 'rejuvenation', laser ablation for benign conditions and cosmetic vaginal procedures. 2016. https://www.ranzcog.edu.au/RANZCOG_SITE/media/RANZCOG-MEDIA/Women's%20Health/Statement%20and%20guidelines/Clinical%20-%20Gynaecology/Vaginal-rejuvenation,-laser-and-cosmetic-procedures-(C-Gyn-24)-Amended-July-2016.pdf?ext=.pdf. Accessed July 14, 2018.
9. Braun V. Female genital cosmetic surgery: a critical review of current knowledge and contemporary debates. *J Womens Health (Larchmt).* 2010;19(7):1393-1407.
10. Tiefer L. Female cosmetic genital surgery: freakish or inevitable? Analysis from medical marketing, bioethics, and feminist theory. *Feminism Psychol.* 2008;18:466-479.
11. Barbara G, Facchin F, Buggio L, Alberico D, Frattaruolo MP, Kustermann A. Vaginal rejuvenation: current perspectives. *Int J Womens Health.* 2017;9:513-519.
12. Renganathan A, Cartwright R, Cardozo L. Gynecological cosmetic surgery. *Expert Rev Obstet Gynecol.* 2009;4:101-104.
13. Iglesia C. Cosmetic gynecology and the elusive quest for the "perfect" vagina. *Obstet Gynecol.* 2012;119:1083-1084.
14. Lista F, Mistry BD, Singh Y, Ahmad J. The safety of aesthetic labiaplasty: a plastic surgery experience. *Aesthet Surg J.* 2015;35(6):689-695.
15. Sorice SC, Li AY, Canales FL, Furnas HJ. Why women request labiaplasty. *Plast Reconstr Surg.* 2017;139(4):856-863.
16. Goodman MP. Commentary on: a retrospective study of the psychological outcomes of labiaplasty. *Aesthet Surg J.* 2017;37(3):332-336.
17. Triana L, Robledo AM. Refreshing labioplasty techniques for plastic surgeons. *Aesthetic Plast Surg.* 2012;36(5):1078-1086.
18. Kelishadi SS, Elston JB, Rao AJ, et al. Posterior wedge resection: a more aesthetic labiaplasty. *Aesthet Surg J.* 2013;33:847-853.
19. Miklos JR, Moore RD. Postoperative cosmetic expectations for patients considering labiaplasty surgery: our experience with 550 patients. *Surg Technol Int.* 2011;21:170-174.
20. Sharp G, Tiggemann M, Mattiske J. Factors that influence the decision to undergo labiaplasty: media, relationships, and psychological well-being. *Aesthet Surg J.* 2016;36(4):469-478.
21. Bucknor A, Chen AD, Egeler S, et al. Labiaplasty: indications and predictors of postoperative sequelae in 451 consecutive cases. *Aesthet Surg J.* 2018;38(6):644-653.
22. Kalaaji A, Bjertness CB, Nordahl C, Olafsen K. Survey of breast implant patients: characteristics, depression rate, and quality of life. *Aesthet Surg J.* 2013;33(2):252-257.
23. Kalaaji A, Dreyer S, Brinkmann J, Maric I, Nordahl C, Olafsen K. Quality of life after breast enlargement with implants versus augmentation mastopexy: a comparative study. *Aesthet Surg J.* 2018; 38(12):1304-1315.
24. Sharp G, Tiggemann M, Mattiske J. Predictors of consideration of labiaplasty: an extension of the Tripartite Influence Model of Beauty Ideals. *Psychol Women Quart.* 2015;39:182-193.

25. Baumeister H, Härter M. Prevalence of mental disorders based on general population surveys. *Soc Psychiatry Psychiatr Epidemiol.* 2007;42(7):537-546.
26. Sandanger I, Nygård JF, Ingebrigtsen G, Sørensen T, Dalgard OS. Prevalence, incidence and age at onset of psychiatric disorders in Norway. *Soc Psychiatry Psychiatr Epidemiol.* 1999;34(11):570-579.
27. Lehtinen V, Sohlman B, Nummelin T, Salomaa M, Ayuso-Mateos JL, Dowrick C. The estimated incidence of depressive disorder and its determinants in the Finnish ODIN sample. *Soc Psychiatry Psychiatr Epidemiol.* 2005;40(10):778-784.
28. Leiknes KA, Finset A, Moum T, Sandanger I. Current somatoform disorders in Norway: prevalence, risk factors and comorbidity with anxiety, depression and musculoskeletal disorders. *Soc Psychiatry Psychiatr Epidemiol.* 2007;42(9):698-710.
29. Kringlen E, Torgersen S, Cramer V. Mental illness in a rural area: a Norwegian psychiatric epidemiological study. *Soc Psychiatry Psychiatr Epidemiol.* 2006;41(9):713-719.
30. Veale D, Eshkevari E, Ellison N, et al. Psychological characteristics and motivation of women seeking labiaplasty. *Psychol Med.* 2014;44(3):555-566.
31. Crouch NS, Deans R, Michala L, Liao LM, Creighton SM. Clinical characteristics of well women seeking labial reduction surgery: a prospective study. *BJOG.* 2011;118(12):1507-1510.
32. Miklos JR, Moore RD. Labiaplasty of the labia minora: patients' indications for pursuing surgery. *J Sex Med.* 2008;5(6):1492-1495.
33. Rouzier R, Louis-Sylvestre C, Paniel BJ, Haddad B. Hypertrophy of labia minora: experience with 163 reductions. *Am J Obstet Gynecol.* 2000;182(1 Pt 1):35-40.
34. Sharp G, Mattiske J, Vale KI. Motivations, expectations, and experiences of labiaplasty: a qualitative study. *Aesthet Surg J.* 2016;36(8):920-928.
35. Bramwell R, Morland C, Garden AS. Expectations and experience of labial reduction: a qualitative study. *BJOG.* 2007;114(12):1493-1499.
36. Munhoz AM, Filassi JR, Ricci MD, et al. Aesthetic labia minora reduction with inferior wedge resection and superior pedicle flap reconstruction. *Plast Reconstr Surg.* 2006;118:1237-1247; discussion 1248-1250.
37. Zwier S. "What Motivates Her": motivations for considering labial reduction surgery as recounted on women's online communities and surgeons' websites. *Sex Med.* 2014;2(1):16-23.
38. Koning M, Zeijlmans IA, Bouman TK, van der Lei B. Female attitudes regarding labia minora appearance and reduction with consideration of media influence. *Aesthet Surg J.* 2009;29(1):65-71.
39. Placik OJ, Arkins JP. Plastic surgery trends parallel Playboy magazine: the pudenda preoccupation. *Aesthet Surg J.* 2014;34(7):1083-1090.
40. Liao LM, Taghinejadi N, Creighton SM. An analysis of the content and clinical implications of online advertisements for female genital cosmetic surgery. *BMJ Open.* 2012;2:e001908.
41. Veale D, Eshkevari E, Ellison N, et al. A comparison of risk factors for women seeking labiaplasty compared to those not seeking labiaplasty. *Body Image.* 2014;11(1):57-62.
42. Goodman M, Fashler S, Miklos JR, et al. The sexual, psychological, and body image health of women undergoing elective vulvovaginal plastic/cosmetic procedures: a pilot study. *Am J Cosmetic Surg.* 2011;28:219-226.
43. Goodman MP, Placik OJ, Matlock DL, et al. Evaluation of body image and sexual satisfaction in women undergoing female genital plastic/cosmetic surgery. *Aesthet Surg J.* 2016;36(9):1048-1057.
44. Oranges CM, Sisti A, Sisti G. Labia minora reduction techniques: a comprehensive literature review. *Aesthet Surg J.* 2015;35(4):419-431.
45. Goodman MP, Placik OJ, Benson RH 3rd, et al. A large multicenter outcome study of female genital plastic surgery. *J Sex Med.* 2010;7(4 Pt 1):1565-1577.
46. Sharp G, Tiggemann M, Mattiske J. A retrospective study of the psychological outcomes of labiaplasty. *Aesthet Surg J.* 2017;37(3):324-331.
47. Motakef S, Rodriguez-Feliz J, Chung MT, Ingargiola MJ, Wong VW, Patel A. Vaginal labiaplasty: current practices and a simplified classification system for labial protrusion. *Plast Reconstr Surg.* 2015;135(3):774-788.